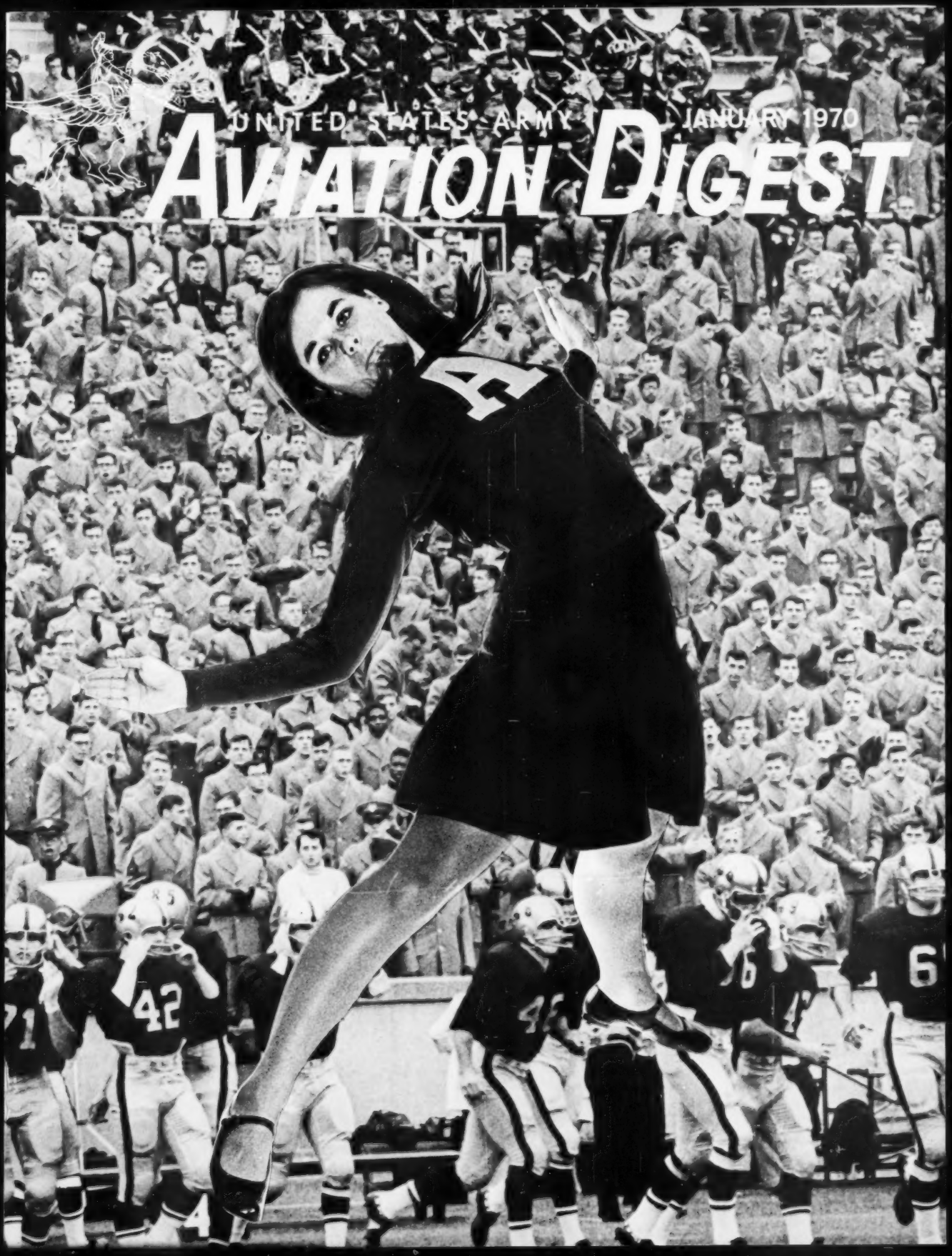
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JANUARY 1970
AVIATION DIGEST

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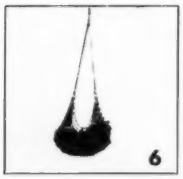
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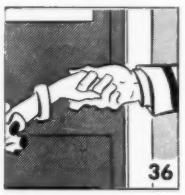
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ABOUT THE COVER

In this month of bowl games, the DIGEST salutes football, a sport which helps develop the coordination, stamina and dedication required for future aviators and the safety of their aircraft and crews. Cheering on the Army team is Miss Barbara Lindstrand, daughter of COL and Mrs. N. L. Lindstrand Jr., Ft. Rucker, Ala.

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

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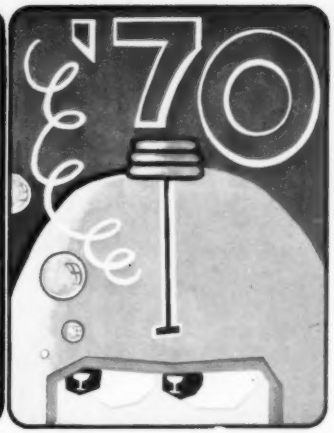
VIEWS FROM READERS



Sir:

Due to the rapid growth of Army aviation in the past years we are experiencing many situations where there is a loss of many valuable manhours and aircraft availability caused by a lack of knowledge or lack of experience on the part of our maintenance personnel.

There are many factors that contribute to this; some are beyond our control but we can eliminate some of them ourselves. Some factors are:

- Rapid promotions
- Transfers from other career groups
- Assignments to units issued "in lieu of" aircraft
- Assignments to units having a variety of aircraft
- Assignments to units having an excess of higher grade enlisted men
- Assignments out of MOS occupational speciality (like a 67N being in 67M)
- Lack of knowledge of basic maintenance practices and proper procedures

I know that there is no substitute for experience but we can come a little closer to solving or decreasing this lack of experience by increasing our knowledge.

We can increase our knowledge in many ways, i.e., attendance at colleges or universities, service academies and schools. Of course we can't always avail ourselves of these, so that leaves us with three other ways—unit schools, extension courses and on-the-job training (OJT).

Unit schools are not always available and OJT is sometimes slow and time consuming which leaves correspondence courses. Correspondence courses offer us a wide range of training and only cost us time, not a cent of money. They not only give knowledge and help on the job, they also, as of August 1968, count 1 point per credit hour (up to 30 points) on promotion boards (in case some men didn't know or realize this) and also adds more points on the self-improvement portion of the board form.

Correspondence courses are offered by most service schools. DA Pamphlet 350-60 offers enrollment procedures and lists most of the courses offered by the service schools with a short synopsis of the courses.

The chart below lists some of the courses offered by the Aviation School at Ft. Rucker, Ala., in the order I would suggest.

As you will notice at the present time there is only one type of aircraft familiarization offered. It is hoped that in the near future a larger variety of courses will be offered. More courses are being written and will be offered in the coming year.

I hope that we will eventually be able to get familiarization courses for each type of aircraft so that when enlisted men are transferred to a unit having different types aircraft they will have some knowledge of the aircraft. I have been in the Army for 16 years. During that time I have never been assigned to a unit that had aircraft I was previously trained to maintain. But by virtue of correspondence courses, two-week factory courses and OJT (I have only the entry course when the Air Force was teaching it) I am now fixed and rotary, single and multi-engine, single and tandem rotor qualified.

If enough of us ask for these types of courses we might get results, so let's ask for them and let's utilize the ones already available.

SFC Johnny J. Broussard
Department of Tactics
Ft. Rucker, Ala. 36360

• The most difficult job for the Aviation School's Department of Nonresident Instruction is to evaluate the effectiveness of the courses offered and program new courses offering the greatest benefit to the maximum number of personnel in the field. The time element in revising established courses and preparing new courses precludes a large number of new courses from being offered each year. However a conscientious effort is made to establish new courses each year that are the most useful to the troops in the field.

Student end-of-course critiques provide us with only a limited "feedback" as to the effectiveness of established courses. Admittedly this is not a very efficient method because it does not indicate how much more effectively the former student performs his job. A note from the student's supervisor a month or two after he has completed a course would be more beneficial.

The programming of new courses is as important as evaluating the effectiveness of established courses. Indications

Continued on page 35

Course No.	Title	Credit Hr.
AVN 15	Army Aviation	2
AVN 51	Introduction to Army Aviation and the Army Maintenance System	4
AVN 20	Aircraft Maintenance	3
AVN 50	Organizational Aircraft Maintenance (Super)	26
AVN 19	Aviation Maintenance and Supply, Forms and Publications	9
AVN 27	Aircraft Accident Prevention	1
AVN 55	Army Aircraft Systems	9
AVN 5	Designations, Characteristics, and Weight and Balance of Army Aircraft	8
AVN 57	Ground Handling, Auxiliary Ground Handling Equipment and Mechanic's Hand Tools	6
AVN 76	UH-1 General Familiarization	5

TRIPLE NICKEL...

Tracers continued to crisscross in front of us, so I told the door gunners to quit firing—in hopes that the enemy would lose us in the ink black night. Then, as we took a couple of hits, I was startled by the radio which crackled, "Triple Nickel, shut off your lights . . . you're taking fire."

Captain Anton J. Skarich

IT WAS 1700 hours in the Republic of Vietnam when our operations officer carefully printed my name on a mission board labeled "Emergency Resupply." He also put up the aircraft number 8555 and the names of the rest of the crew.

My name had been posted before, however I had never been called on to fly. So it was without great apprehension that I went down to preflight the UH-1. Because Triple Nickel (named for its serial number and the three Indianhead nickels taped to the instrument panel) was by no means the newest nor the strongest in our corral, I performed a *very* thorough preflight but couldn't locate a grounding condition.

Considering the proposed mission, the crew chief and I discussed a project we had considered previously and decided to carry out a small modification on Triple Nickel before nightfall. I always had thought that it would be convenient to have a small dim light on the underside of an aircraft to aid in landing at night in tactical LZs. Landing lights or searchlights are easily seen by the enemy, as are position lights.

Since it was impractical to mount a new light, I decided to modify one of the two that already were installed—the landing light being the victim of my efforts. After all, this still left us with a searchlight.

We covered the landing light with green masking tape, leaving only a small narrow slit through which light could pass. Then we headed for the mess hall where the operations officer informed me that I had been assigned a new copilot who had gone to the aircraft to stow his gear. After supper it was dark enough to try out our light, but an unscheduled safety meeting canceled that plan.

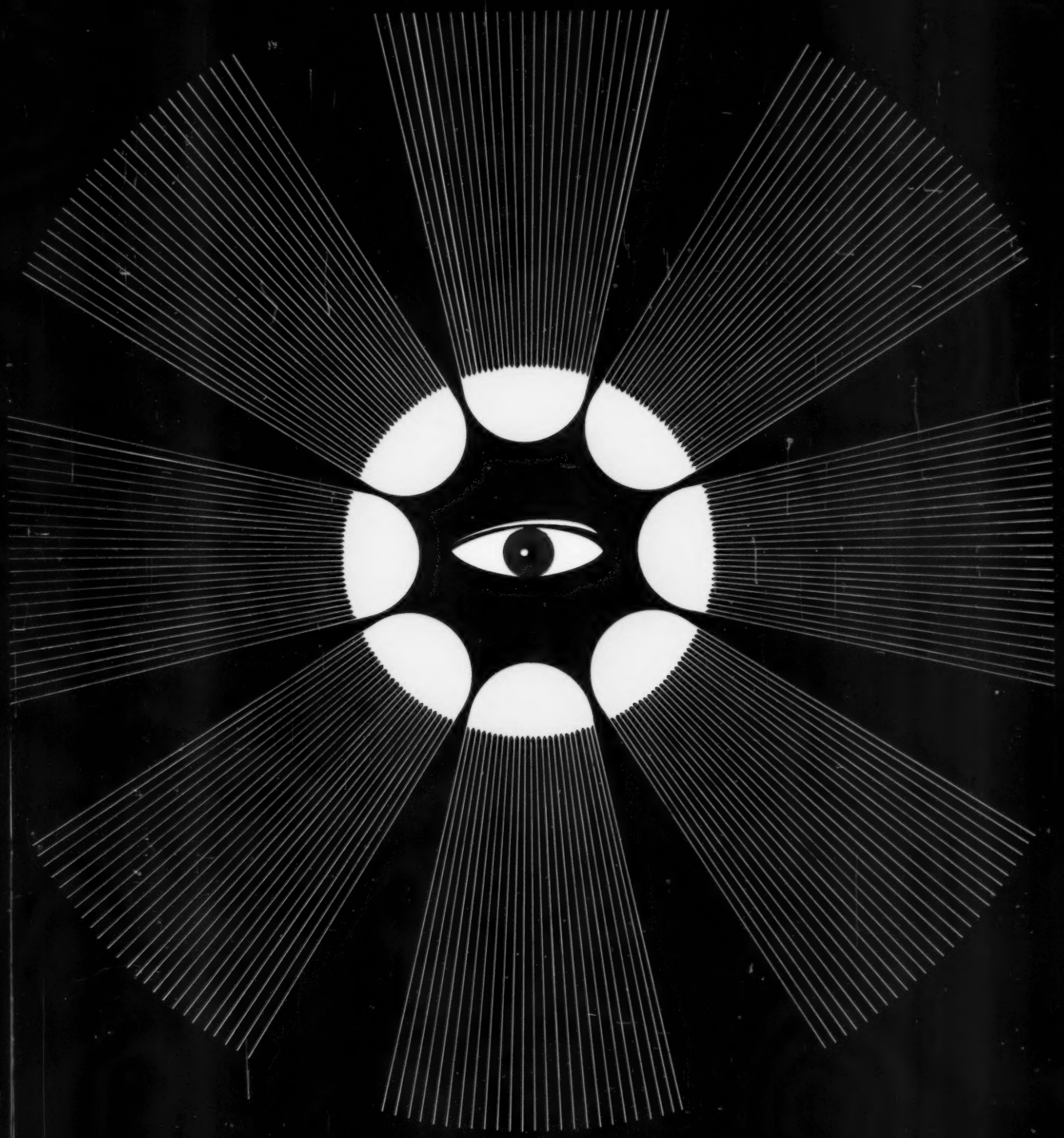
When the safety meeting was almost over the operations NCO popped his head into the tent to tell me to crank up as soon as possible and that he would send the mission sheet out to the aircraft in about three minutes. As the copilot cranked the engine I was handed a mission sheet directing us to pick up ammunition at a base camp and take it to a platoon size element which was under attack. Two AH-1G Cobras were to be supplied as escorts.

After a quick commo check I briefed my crew and we took off for the fire support base. During the approach I told the Cobras to remain airborne while I picked up the cargo. I landed on a well lighted pad where the logmaster informed me that he had two slingloads of miscellaneous ammo, each weighing approximately 1,000 pounds. After I dropped off the slingload I was to land and pick up four wounded men.

Since it was dark and the LZ was in mountainous jungle terrain, I asked the logmaster to break the cargo into three internal loads of about 700 pounds each. After all, I was flying Triple Nickel and knew the old girl wouldn't be as efficient with a slingload hooked to her belly.

After we were loaded I asked the copilot to fully extend the searchlight and turn it on so I could check for obstructions in our takeoff path. Shortly after liftoff he turned off the searchlight and I gave the aircraft to him. We turned to a heading of 240 degrees (which was to take us to the vicinity of the LZ) and tuned the FM radio to give the ground commander a call.

"Roving Gambler six India, this is Black Bandit five five five, over." No answer. We tried again—still no answer. I thought we were probably too far away. After 20 minutes of churning through the black skies and numerous radio transmissions, I finally got an answer.



... WINKS AT THE WORLD

TRIPLE NICKEL...

"Sorry I didn't answer you earlier Bandit five five five but we've been busy."

"No problem," I told him. "Flight of three should be over your approximate position. Do you have us in sight?"

He said he had three aircraft in sight due east of his position. While my copilot turned to a heading of 270 degrees the radio operator continued to brief me on the situation.

"Light enemy fire in the southern sector, moderate to heavy fire all others. Recommend approach heading 360 degrees. Be advised high obstructions north of our LZ. Suggest you depart to the south."

My map disclosed a steep ridge line north of the small hill that marked the LZ. It was this ridge line from which the heaviest concentrations of enemy fire were coming. As Roving Gambler six told me we were approaching the LZ, I asked if he had illumination? He said he had three holes dug about 12 inches deep and had placed C-ration cans filled with burning gasoline in them. My gunner caught sight of the three lights and we headed for them.

"Roving Gambler six India, Bandit Triple Nickel. I have you at my twelve o'clock. Standby."

The gunships were notified that I would be blacking out after descending through 1,500 feet AGL. They rogered and I took control of the aircraft and began my approach while the copilot shut off the position lights, rotating beacon and dimmed the instrument lights. We both locked our shoulder harnesses and the crew chief and gunner readied their M-60 machineguns.

"Gambler six India, Bandit Triple Nickel inbound, over."

"Gambler six India, roger. Standing by."

As I was descending in a left turn to keep the LZ in sight, I remembered that the landing light was taped up! Oh well, I thought, now is as good a time as any to see if it works. If it's too bright, I can always shut it off. I told my copilot to be ready to turn on the landing light when I gave the word.

As I rolled out on final heading of 360 degrees I experienced the unexpected. The three lights which had been easy to see from directly overhead were now very difficult to pick out—then they disappeared!

I pulled in power and leveled off, hoping to see the lights again. A few tracers streaked skyward well ahead of us. Maybe that's them, I thought. No! There they are at nine o'clock low! Three small fires unmistakably marked the LZ as it slipped past us.

I knew I didn't have enough room to turn the ship around and had visions of that ridge line looming ahead. As I pulled in power, I told my copilot to turn on the searchlight. He had his hand perched on the landing light switch and *that* was the switch he pushed. Nothing happened.

"The searchlight! Turn on the damn searchlight! I can't see where I'm going," I shouted.

"It doesn't work. I've got it turned on," he replied.

Just about that time the copilot decided to try the other switch on his collective head with remarkable results. The illuminated ridge line appeared easier to clear than I had thought, however, ground fire had picked up considerably.

As soon as we knew we would clear, the copilot turned the searchlight off, but tracers continued to crisscross in front of us.

I banked the aircraft left to avoid the deadly fire and return to the LZ. Both door gunners were returning fire, so I told them to cease fire in hopes the enemy would lose us in the ink black sky. After all, the friendlies were not able to see us after we had blacked out nor were the gunships.

I felt the aircraft take a couple

I banked the aircraft to avoid the deadly fire

hits as we continued to take fire. Then came the answer.

"Bandit Triple Nickel. Shut off your lights. You're taking fire."

The first part of the message came as a surprise—the latter was obvious. I reached over and shut off the landing light. Scattered ground fire continued but was much less accurate. I rolled out on final and set up a steep approach, keeping the three small fires in sight.

As I neared the LZ at about a 30 foot slow hover, the copilot switched on the landing light which filled the black LZ with a soft greenish glow. Through the chin bubble I could see soldiers covering the small fires to keep them from fanning in my rotor wash. We touched down and immediately shut off the light.

The ground troops unloaded the aircraft and the four wounded men were placed on board. The gunships were placing suppressive fire around the LZ when I advised them we were coming out to the south. The light came on and we lifted from the ground. As soon as we cleared the 30 foot trees surrounding the LZ, the light was turned off and we climbed through 2,000 feet toward the fire base.

About five minutes later the crew chief reported hydraulic fluid fumes. I notified my company that I would be going to Quang Tri, an airfield a short distance from my home base. Our company operations officer assured me that two aircraft were being scrambled—one to take over my mission and another to escort me to the airfield. Although the controls seemed moderately stiff, neither the master caution light nor the hydraulic fail light came on.

After an uneventful landing at Quang Tri, we shut down and counted a total of 11 hits spattered around Triple Nickel's fuselage, many a result of the green light in the belly.

The lesson learned from this episode is really threefold. First, don't make *any* unauthorized operational changes to Uncle Sam's airplanes. Even though they appear harmless, they may have serious consequences. Secondly, brief your copilot *completely*. Don't surprise him. You may be the one who's surprised.

Finally, if you're going to wink at the world from 500 feet, do it where the world will just *wink* back.

SLINGLOAD

WHY Y Y Y Y NOT?

One unit that recently switched to slingloading as a standard means of transporting cargo found that advantages far outnumbered disadvantages

Major William D. Dantzler Jr.

IN A COMBAT environment, particularly in the Republic of Vietnam, commanders of helicopter units are forever asking themselves this basic question: How can I increase my support to the combat units and at the same time increase the availability of aircraft?

This question might best be answered by one simple word: slingloads.

Slingloads you say? Did I hear you say slingload everything?

Why not?

Most of the Army's inventory of helicopters are designed to carry loads internally like trucks. After all, cargo is loaded inside a truck, not underneath.

Why then can't the Army adopt the slingload as one of its primary methods of transporting everything from life-sustaining water to ammunition and weapons? One reason is that helicopters are *not* trucks and therefore should not be thought of in terms of how much will fit inside but rather as to how much weight will it carry today.

It has been found that for various reasons inconsistencies crop up when loading cargo inside a helicopter. For instance, each individual pilot tends to have his own formula for loading a particular aircraft. This becomes confusing to ground unit personnel who can't see why one helicopter can carry a certain load while another identical aircraft carries slightly less. Then the next day, due to a high density altitude, neither aircraft is able to haul as much as the day before, yet both have plenty of room left for cargo.

The basic problem lies in communication. The more complex the language or terminology, the harder it is for ground personnel to understand the problems of the aviators. Yet it is the ground commander who must ultimately get the most utilization from the aircraft allotted him.

Most resupply helicopters are allocated to a major unit such as a brigade, regiment or sector for a certain time period. These units in turn allocate the helicopters to a smaller unit such as a battalion or subsector for a certain time frame. Although there are some definite advantages to this system, it breeds some inherent misutilization dangers for the combat support aviation units—mostly because of the communication problem.

One assault helicopter commander faced with these inconsistencies decided to try switching to slingloading as the standard form of loading. He felt that slingloading would simplify the terminology, thereby preventing a good deal of communication misunderstandings and increasing the efficiency of the aviation unit. He decided to present the concept to the commanders of the units he supported by enlisting their cooperation based on the promise of more and better aviation support. It was felt that

Carrying cargo internally usually is more time consuming than slingloading. It also involves problems such as loading and tiedown procedures which vary from pilot to pilot and aircraft to aircraft. Further, carrying cargo internally often requires that there must be a good landing zone at the delivery point. At right, troops of the 1st Cavalry Division (Airmobile) laboriously load a UH-1 with bags of rice captured during a search and destroy operation in Quang Tri Province

Slingload It–Why Not?

the commanders would not make extra preparatory efforts solely to conserve aviation resources, but the promise to provide more support in a more efficient manner was a worthwhile goal.

The commanders were subsequently presented with the plan which included six key factors:

• Whenever feasible, materials would be moved by the slingload method.

• Sling equipment (endless straps, nets, doughnuts and clevis) would be requisitioned and distributed to battalion S-4s.

• Personnel in line companies and S-4 personnel would receive thorough training in hand and arm signals, hookup procedures and load preparation.

• In cases where supported units were Allied forces, one Allied "guide" with an FM radio, a tactical map and a firm knowledge of unit locations would be required for each resupply helicopter. The guide would use his radio to coordinate with the S-4 at the pickup point and with the CO of the line company in the field.

• Water containers would be provided, either by requisitioning available containers or fabrication from locally procured materials.

• Helicopter crews would be given additional training in slingloading operations.

Preparations were made with the aviation unit assisting in training of ground personnel and increasing the proficiency of its own personnel. Soon the plan was put into practice and its continued use speaks for its effectiveness.

The advantages accrued by the aviation unit are many. They come under the headings of safety, maintenance and operational efficiency which together add up to conservation of resources.

The most outstanding safety factor afforded is the ability to jettison the load in an emergency situation. When the slingload is jettisoned, there are no loose items in the hold that could become missiles upon ground impact. All slingloads are hover checked while the aircraft is out of ground effect, which gives an extra ounce of insurance.

Ground personnel are safer too, since the rotor blades are not low enough to hit a man. There is no need for ground personnel to come near the helicopter to unload. If a poor LZ requires the dropping of a slingload to accomplish delivery, the entire load falls in one place and only one exposure to falling items is necessary.

Another safety advantage is gained in the area of pilot techniques required for slingloads. Proficiency, confidence and crew coordination are increased greatly. The smooth control touch and prior planning developed in hauling slingloads becomes instinctive and carries over into other operations. Poor pilots stand out in slingload operations and can either be given additional training or removed from the cockpit to avert accidents.

The aviation unit also benefits from a maintenance standpoint. There is much less wear and damage to the interior of the ship. The constant use of the cargo hook increases the proficiency of maintenance personnel in diagnosing and repairing the hook, resulting in a higher operational ready status.

The payoff for the aviation unit comes in the form of increased efficiency. More cargo is hauled per hour of flight because the load is ready to hook up and deliver. The aviation unit can use part of the time gained to increase the amount of support provided and use the remainder for during operations maintenance checks and crew rest.

Also loads that are droppable can be delivered where there are no LZs because the large slingload can be found and recovered, whereas small, loose items delivered by the kick out method cannot easily be found in dense undergrowth.

When weather presents a problem, the faster turn around time will result in more supplies being moved during periods of flyable weather.

There is less opportunity for hitchhikers when using slingloads. Ground units are encouraged to consolidate personnel on low priority administrative trips and hold them until a full load is available. And, ground personnel begin to think of weight rather than space as the limiting factor for a helicopter.

From an efficiency (or better support) viewpoint, the ground unit has loads that are made to order for the using company or platoon. The loads are delivered closer to schedule and require less time when recurring sorties must be made. Loads can be placed precisely on LZs, within artillery gun positions or on trucks, thus reducing the time required to distribute the load to the individual user. Mixed loads of low density items can be hauled in the sling while personnel or high density items can be loaded internally.

Constant use of slingloading techniques has pointed out some areas that should be closely watched. First, the supported units must make recurring inspections of all sling equipment in order to requisition replacements for lost or damaged items. It is wise to obtain authority to requisition a double issue of sling equipment. Also, emphasis must be placed on coordinating the back-haul of sling equipment to the supply point as

Slingloading enables droppable loads to be delivered in areas where there are no LZs. At left, a UH-1 hauls water cans in support of combat units of the 4th Infantry Division operating near Dak To

soon as possible so that it can be reused, and also to prevent the troops in the field from misutilizing the web straps. Secondly, units must allocate more time and personnel to properly prepare slingloads and must coordinate much more when requesting resupply.

Disadvantages for aviation units engaged in slingload operations are far outweighed by the advantages, but merit discussion. Hovering with a slingload requires high torque, consequently more rotor wash, more trash disturbance, more air intake and possibly more exposure to FOD. However, the engine air intake is higher from the ground and is usually too high to ingest most foreign objects.

The helicopter hooks up and departs quicker because the load has been prepared in advance. Because of the expeditious hookup, the possibility of FOD may actually be reduced. When operating with slingloads the hover check will normally be made when the helicopter is out of ground effect. The resulting higher EGT and higher torque may decrease the life of the engine slightly.

The aviation unit must establish and disseminate an SOP which includes a practical aircraft load limit. There is a bright future for the aviator who can devise a simple chart that would compute density altitude from temperature and elevation in meters (from tactical maps). One unit's SOP established the UH-1H load limit at 1,000 pounds except for the period from 1000 to 1400 hours, when the limit was 800 pounds.

So, slingloads, you say?

Why not?

Presenting OPERATION STANDARD RATING

Major Robert S. Fairweather

Army tactical instrument graduates have contributed significantly toward giving units an extension of capabilities during adverse weather conditions in the Republic of Vietnam. These aviators will be qualified to meet FAA requirements

THE ARMY RECENTLY launched Operation Standard Rating, a program aimed at providing unit commanders with newly graduated aviators having a day/night, all-weather capability.

The operation was spawned by the continuing in-house evaluation of ORWAC/WORWAC (officer/warrant officer rotary wing aviator courses) training conducted at Ft. Rucker. Ala., by the United States Army Aviation School (USAAVNS). One area that USAAVNS personnel have been monitoring closely is the existing tactical instrument program which has been a major step forward in that its implementation in 1966 provided a great increase in instrument training.

Tactical instrument graduates have contributed significantly toward giving units an extension of capabilities during adverse weather conditions, especially in the Republic of Vietnam. However, two

problem areas concerning the tactical instrument ticket have arisen.

The first is real in nature and involves the limitations of a tactical instrument aviator when faced with an FAA environment. Neither his training nor his clearance authority by AR 95-1 have allowed him to fly in instrument conditions in the continental United States.

The second area is philosophical in nature. Since a tactical instrument rating is subordinate to a standard instrument qualification, there is a general feeling that the aviator so qualified is not truly instrument capable. Unit commanders are not exactly sure of how to use the man. The tactical instrument aviator, himself, sometimes feels as if he is a second-rate citizen of the air and not one of the true professionals.

By direction of the assistant commandant, USAAVNS, a test was conducted to qualify the maximum number of ORWAC/WORWAC students for a standard instrument rating. Twenty-seven WORWAC students were selected as a representative sample of a normal class and began instrument training on 4 Jan 1969 in the TH-13Ts. Flight training consisted of approximately 50 instrument flight hours (hood) and advanced instrument maneuvers and procedures were introduced in the second week of instruction. In addition, each student was scheduled for 20 hours of synthetic instrument training (link) integrated with programed academic instrument instruction. Results of the test were highly encouraging as 23 of the 27 students qualified for a standard instrument rating.

A program for implementation based on the test results was developed at USAAVNS. The basic thought behind development of all plans was to produce a curriculum which could be timely implemented, would assure a reasonable degree of success and would logically evolve to meet future requirements. This implementation program was received and approved by the USAAVNS commandant, Major General Delk M. Oden, last June. Continental Army Command has recently directed that USAAVNS include graduation of initial entry rotary wing students with a standard instrument rating in FY 71 aviation planning.

Implementation of the program will be in two phases. Phase one began last July and involves the start of preparation and planning for subsequent phases and the training of a limited number of selected students for standard instrument qualification through the use of selected link and flight instructors, supplementary programed instruction and a modified program of instruction. Valuable data is being derived from the training of these students for application during subsequent implementation.

Phase two is programed to replace phase one in February. The Program of Instruction (POI) for phase two consists of 10 weeks and 60 flight hours of instruction. The first stage includes two weeks of integrated link and academic instruction and no flight training. Following these two weeks of preflight will be a four week stage given by contract instructors at USAAVNS which covers basic and limited advanced instrument flight instruction. The final stage will also be four weeks in length, will cover advanced instrument flight instruction and will be given by military instructors. Preparations for phase two include modifications to the airspace structure and to the synthetic trainers. Specific details concerning implementation are, of course, dependent upon resources and funds available and are subject to change.

Great benefits will be derived from the program. Not only will the graduating student have more personal satisfaction in attaining a valuable qualification, but the Army will gain in terms of an increased all-weather flight capability. The problems incurred, such as an increased requirement for examiners and a possible need for revision of AR 95-63, are now under study and appear to have feasible and realistic solutions. The future commander, upon receiving a newly graduated aviator, can be assured that the new addition will be a valuable asset for mission accomplishment.

The Mapmaker's Wings

Inter-American Geodetic Survey teams are mapping heretofore uncharted areas in Central and South America with the aid of U. S. Army aircraft. The great mobility provided by Army aviation is helping to make the project successful

CW2 James N. Post

JUNGLE MOUNTAIN flying techniques developed by U. S. Army aviation units in the Republic of Vietnam have proved valuable to one of the most unusual and ambitious peacetime projects now being conducted by the nations of the Americas.

Among the sciences which have contributed most to the expansion of the civilized world, few have been so significant as the development of the techniques of mapmaking. The earliest attempts to map South America were made in the early 1500s by Amerigo Vespucci. Since that time, efforts have been made by numerous independent agencies and governments to provide accurate maps for the countries of Latin America to use in realizing the full potential of their vast economic, cultural and human resources.

In 1946 the U. S. Army became concerned about the shortage of such maps and the complete lack of a centrally organized system of surveying and preparing them. The resulting action produced the U. S. Army Inter-American Geodetic Survey (IAGS), a cooperative effort by almost every nation south of the Canadian border.

A major key to its successes during the past 20 years has been the development of the use of aircraft to support the surveying operations. The recently completed work in Honduras provides an excellent example. Adventure writers have for years set the scene of their stories *deep in the uncharted jungles of Honduras*. Until recently, the phrase was completely accu-

rate. The terrain is such that lack of adequate transportation made surveying tedious and prohibitively time-consuming. About a year ago IAGS instituted a crash program to complete the field classifying, surveying and photographing necessary to provide the data from which the cartographic staff of the Honduras Instituto Geografico National (IGN) could compile their charts. In September 1968, teams of classification experts and survey crews from IAGS met with their Honduran counterparts to begin the task of recording mile by mile of unexplored jungle accessible only by air or a week-long journey by foot and native canoe. It quickly became apparent that unless effective transportation was available, the jungle would beat them and the timetable could not be kept.

The answer was provided by the IAGS aviation element, which flew in two UH-1Ds. With their support, the critical phases of the effort were completed in a few months. The aviation element conducted its operations using lessons learned in Vietnam as a model. The Honduran terrain is much like the highlands and mountainous regions of Vietnam and the climate offers no problems that Vietnam experienced pilots would find new. Most IAGS pilots are veterans of at least one tour in combat.

A jungle mountaintop landing pad presents little problem to the Vietnam-experienced pilots assigned to the IAGS Aviation Element in Honduras

The aviation base camp was placed at Catacamas, a remote jungle village with facilities for landing fixed wing U-1As. Heavy supplies were flown from the IAGS headquarters at Ft. Clayton, Canal Zone, to Tegucigalpa, the Honduras capital, by U. S. Air Force C-130s. Close cooperation by the Air Force permits IAGS to use USAF photo recon and cargo aircraft to augment its own helicopters and light planes. Fuel in 55-gallon drums and other supplies were flown from Tegucigalpa by U-1A to the base camp 70 miles into the jungle. Here the teams set up their operations office in a tent and built a bladder-type POL point for the aircraft.

The mapping operations dictated that points easily identifiable on aerial photos be located and survey crews placed on each one to tie them into a network of triangulation points. The picture points were usually small, cleared areas along the banks of rivers or near one of the small plots cut by local Indians for farming. They were generally confined areas filled with weeds and stumps. Because they required long-range visibility, the

LTC Jack Duncan, commanding officer of the U. S. Army Aviation Element of IAGS, shuts down and takes a break on a jungle riverbank while his survey crews take their readings

triangulation points were usually pinnacles. Because Honduras is a recently volcanic country, these pinnacles may be several thousand feet from the base to a top the size of a badminton court. During the wet season thunderstorms are a daily occurrence and the turbulence around such pinnacles becomes treacherous.

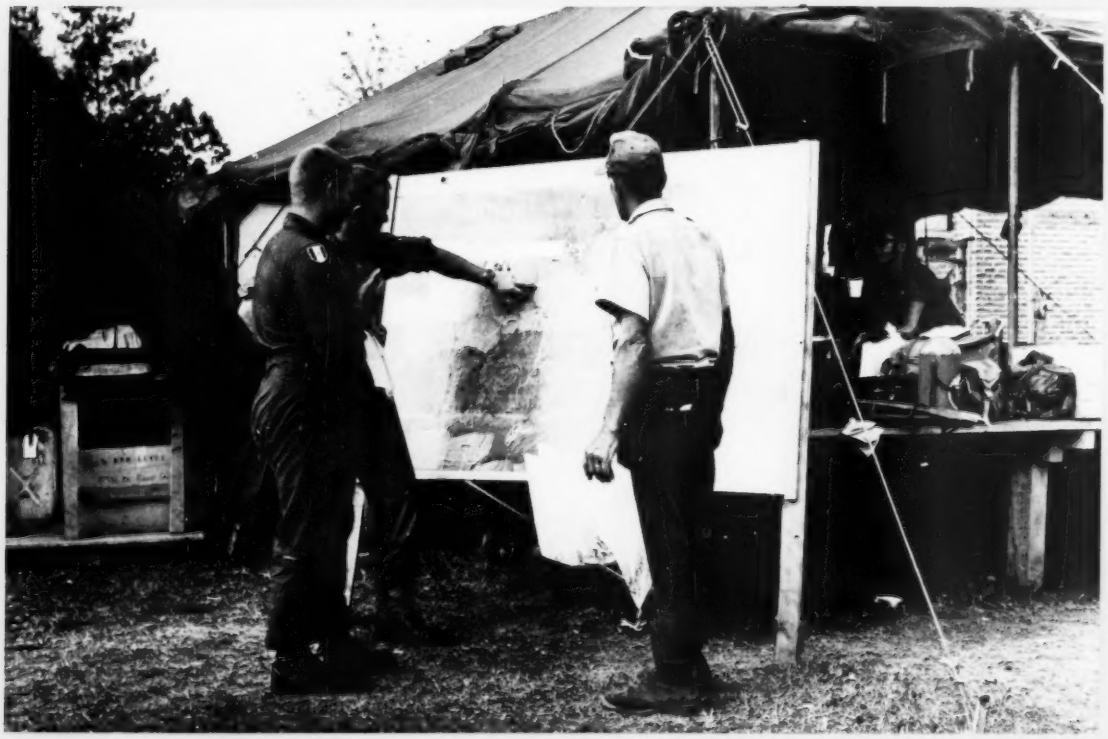
Most of the points chosen did not come equipped with convenient landing space; consequently, the first people on the sites were clearing parties. After instruction by one of the IAGS pilots, a former medevac driver, some parties were lowered by hoist from a hovering UH-1D. When the pad was suitable the aircraft would return to take them out and bring in the survey teams.

Field maintenance crews and relief pilots were flown in regularly from the Canal Zone to insure the best use of the aircraft and to give the crews a chance to get back to civilization. They normally stayed "on project" about 30 days at a time. Maintenance and personnel emergencies were handled by the fixed wing branch. Its pilots made frequent flights from the Canal Zone to Tegucigalpa by U-21 to rendezvous with the project section's U-1A, which made the last leg out to the base camp at Catacamas.

Through the coordinated use of fixed wing and rotary wing Army aircraft and Air Force transports and photo planes, work progressed at a rate which surprised even the veteran engineers supervising the operation. In less time than had been scheduled, the mapping points were located, classified and tied together to form an accurate network from which the cartographers of the Honduran IGN will compile their maps. For the first time in recorded history, those uncharted jungles will be completely and accurately covered by the maps so long needed to develop the vast untapped resources of our sister nation, Honduras.

Such work is currently being conducted by IAGS in 16 countries in Central and South America. The use of aviation support has been a major determining factor in the dramatic progress enjoyed by the unique organization, and the experience gained by Army aviation in Vietnam was of primary importance in providing that support. The goal of IAGS is to map all of Latin America, and the new degree of mobility developed by U. S. Army aviation is helping to make that great endeavor a success.

IAGS helicopter pilots (left) coordinate a mission with Honduras project engineer Rod Saubers using a photomosaic of the area they are mapping



COMBAT INTELLIGENCE FOR AVIATION

Major Charles D. James

THE EFFECTIVE use of gathered intelligence at the working level has been sadly misused—or not used at all—by too many units in their planning of operations. Some S-3s overlook the aviation intelligence aspect in their intense desire to put together a well-coordinated plan. To go one step further, many commanders do not require staff estimates. A portion of this problem also stems from the concept of support, wherein it's presumed that the planning actions are being handled by the supported unit.

To help offset this problem, it recently was decided in the 160th Aviation Group (Combat), 101st Airborne Division (Airmobile), to clarify just which intelligence channels are pertinent and available to aviation. A series of visits was conducted from company through corps level, and astoundingly it was discovered that the vast intelligence-gathering sources were being only partially tapped. Not only does every brigade and above put out intelligence summaries, but the U. S. Navy, Marine Corps and Air Force also are excellent sources which prepare major level consolidations of this intelligence.

Also, all branches of Army, Republic of Vietnam forces, Australian forces, Republic of Korea forces and other Allied elements publish summaries. To top this, all special units such as Delta forces, photo interpretation detachments and photo/SLAR reconnaissance elements prepare reference summaries. All of this data comes in many forms: TWXs, ADP printouts, typed sheets, mimeographed sheets, stenciled sheets or lithographed pages, printed books, charts, photographs, mosaics, logged journals, cards and maps.

The next step was to define all sources of intelligence that were available and pertinent to an area of operations. The latter must not be limited to divisional boundaries for aviation intelligence should encompass all of the area in which a unit may be expected to operate. Aviation sources of intelligence provide data on aircraft receiving fire.

Ground elements look on automatic weapons primarily as an antiground threat rather than as an antiair threat. Although these sources are usually most thorough, the heavy volume of operational radio traffic allows only a smattering of aviation related information to be reported. However, the obvious, like a 37 mm position, will occasionally funnel back from these elements.

Finally, each division and higher headquarters has a reasonably elaborate photo interpretation unit. Some put out reports of sightings and all retain reference files of various sorts.

Logically all of the sources mentioned cannot supply sufficient copies of intelligence reports down to company level, especially when one considers the vast area that some cover. Consequently, it is incumbent on a staff level above battalion to absorb this material and effect reproduction for subordinate units. This reproduction of material is a challenging task considering the abundance that is available. To merely pass on verbatim data is to burden the working levels with analysis, posting, consolidation and distribution problems beyond their TO&E workload capacities. Certainly all out efforts for major operations find manhours amplified, but the daily functions are the key to current posturing.

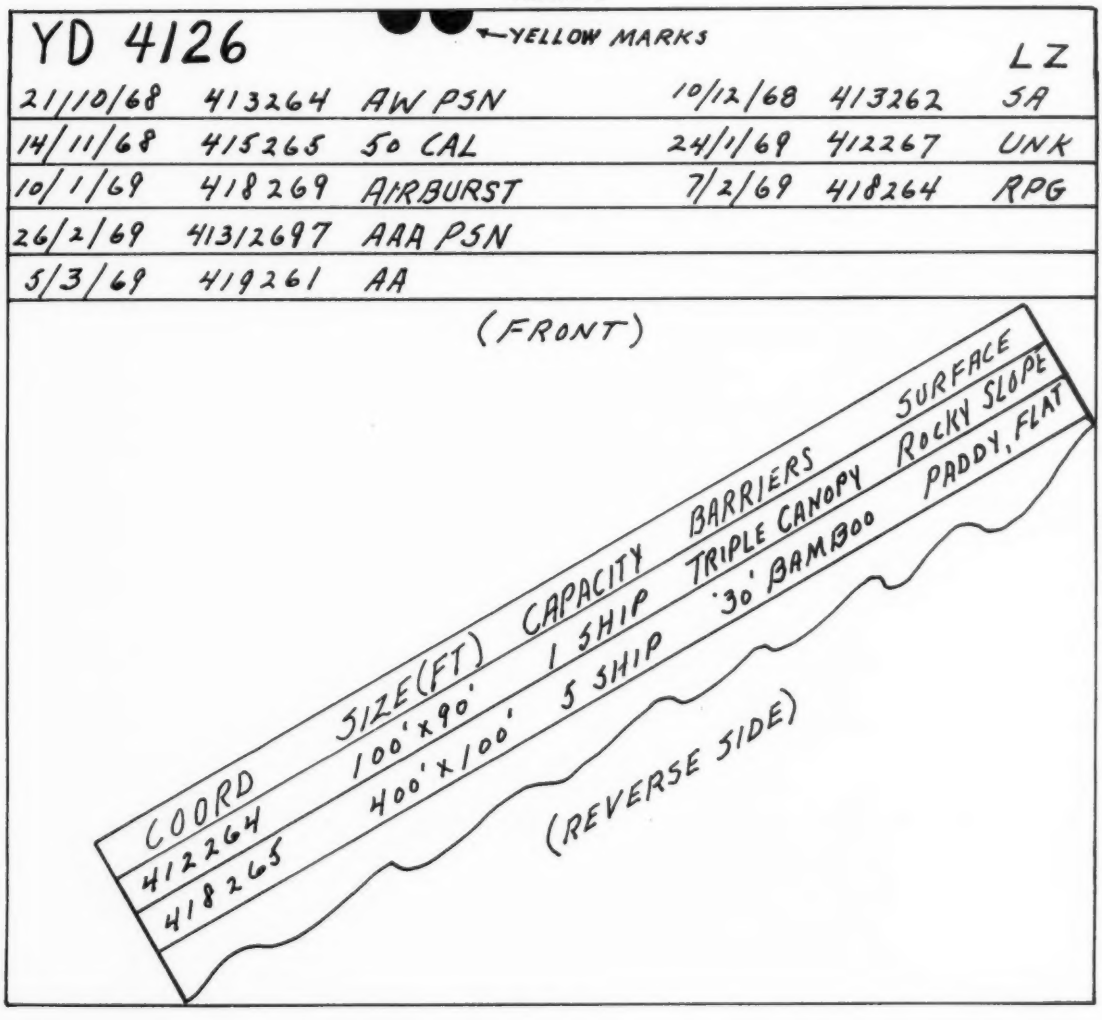
Personnel of the 160th Aviation Group met and analyzed the challenge as a reference work. They started on the first of March 1969 and by April had located 16 sources on whom they prevailed for distribution inclusion. By the first of May six additional sources had been contacted. The majority of these valuable sources had previously

sent nothing—or only courtesy copies—to the division and therefore a large proportion of intelligence information did not achieve its full value. Now the 160th had a tiger by the tail. Literally a file drawer a week was being received.

At first, in setting up their reference file consideration was given to using a 10,000 meter square as a basis for control; but on examination of the corps artillery system of target listing this was obviously too restrictive. Thus a 5″ x 8″ card file system was set up using one card for every 1,000 meter grid square (Figure 1). Due to aircraft stationing and projected mission requirements, virtually the entire I Corps area was reduced to card identification, swelling the files to 15,500 cards.

Each card was identified in the upper left corner with the grid identification. For control, easier selection and to detect misfiling, a system of color and position coding (patterned after the Federal indexing system) was initiated. Since there were twenty-one 10,000 meter vertical grids involved the top of the cards were similarly divided. Within any given column the 10,000 meter horizontal grids were color coded to one of 10 colors corresponding to a numerical value. Then the cards themselves were arranged so that they would read to the right and up each column, in turn, within any 10,000 meter grid. Using this system it is also possible to pull whole 10,000 meter grids at a single grasp so that a vast area around a selected point may be "fanned."

FIGURE 1



Next the techniques of posting entries had to presume certain fixed values. The left half of the card face listed the date, coordinates and type of automatic, antiaircraft and antiaircraft artillery fire received or position plotted. Airbursts were also recorded on the left side. The right half of the card face listed the date, coordinates, type of small arms fire, RPG fire or unknown fire received. The two yellow marks on the top are the Federal indexing, positioned and colored to eliminate filing error and facilitate identification. The colors used for horizontal recognition are 10-20 yellow, 30-40 red, 50-60 brown, 70-80 green, 90-00 purple. Solid for odd and double line for even, thus 26 falls in the double yellow.

To round out the card's value to aviation interests, landing zone data, which includes coordinates, size in feet, number of UH-1 type aircraft an LZ can accommodate, height of barriers and the type of surface, is plotted on the rear of the card.

So, with a carding pattern and a recording technique established, the real task of gathering the aviation history of the 160th's 5,000-square-mile area began. In actuality, many of these actions occurred simultaneously because recording a full year of corps intelligence was not a job that could be accomplished in a week. By mid-May the entries had swollen past the 20,000 mark, not including over 4,000 LZs listed.

Since the 160th's best sources of aviation intelligence come from within its own units, cards printed with the fire incident, spot and PIREP formats were distributed for each aircraft in the division (Figure 2). This allowed the aviator to give only the data needed in the order most quickly copied. This reduced transmission time and encouraged dissemination.

Recently the intelligence section was called on to provide data on an area in the infamous Ashau. The records sweep took 6½ hours covering over 800 grid squares. It pinpointed high threat grids; gave specific targets for forward air controller verification, gunships and artillery; showed low threat history for route selection; defined type of fire to expect; and highlighted recent areas of activity.

On "D" day support fires allowed a 65-ship lift to be executed with only minimal small arms fire received at destination initially. The big guns had been located and thoroughly worked over along the route and near LZs. This was not the same story which unfolded a couple of weeks earlier when an

FIGURE 2

FIRE INCIDENT, SPOT AND WEATHER REPORTING			
C	B	A	
WEA	SPOT	FIRE	
		1	TYPE ACFT
7		1a	ACFT SERIAL NUMBER
	4	5	UNIT
4	5	2	DATE/TIME
3	6	3	COORDINATES
6		4	ALTITUDE
		4a	AIRSPEED
		6	TYPE FIRE (A-SA, B-AW, C-50 CAL,
			D-20 mm, E-OTHER)
		6a	INTENSITY (A-Lt(1-10) B-Mod
			(11-25) C-Hvy (25+)
		7	HITS
5	7		ACTIVITY SEEN (Mvmts, Psns, Huts,
			Wea Cond)
	7	7a	ACTION TAKEN
	8	8	CAS/STATUS (AC, P, CP, CE, G)
			(A-WIA, B-KIA, C-MIA)
		9	ACFT STATUS (A-FLY, B-NO FLY,
			C-DOWNED)
	9	9a	RESULTS OF ACTION TAKEN
			- TO TROOPS
	10	9b	RESULTS OF ACTION TAKEN
			- TO PSNS

operation was conducted without complete aviation intelligence and got a good slap from enemy gunners.

It is not the 160th's intention to stop providing operational assistance at the brigade level. A plan is in the works to provide an intelligence FM secure net on which any aircraft can call for coordinate data while enroute—much the same as artillery control. Under this concept daily fired-at-reports would identify route obstacles around which recommended rerouting would be offered. Additionally fire support base elevations and magnetic bearings could be given, just as LZ data, to assist in locating new bases.

The cards also present an overall view in that they act as the parts of a picture puzzle when transferred to a map.

With postings expected to exceed 25,000, additional studies have been started to evaluate fire activities in light of the overall ground unit positioning. The information is recorded on worksheets (Figure 3). This evaluation may be influential in target selection or offensive ground actions.

Each sheet reports on a full 10,000 meter grid square with this criteria:

- **SA only—Seeks to determine those areas in which no permanent defenses are established yet which shield some activity of a singular denial interest, i.e. a trailway station.**
- **AW only—Seeks to determine those areas in which troops are not necessarily quartered but which have a value for which a more semi-permanent emplacement is appropriate, i.e. storage caves or bunkers.**
- **AA/AAA—Seeks to determine those areas where the presence of such capability would indicate also a capability to defend this firepower, i.e. the site of a nearby permanent camp.**
- **No fire—though ambiguous this can be given four probables, (1) never swept, (2) never flown over, (3) never occupied, (4) so closely guarded that nothing is done to attract attention.**
- **#Month—This seeks to measure the depth and consistency of the perseverance to deny, travel or defend this area.**
- **#Incid—This seeks to measure the volume of the perseverence, and the degree of commital may characterize a force size when matched with the type fire.**

Not included in the columns but a residue of activities, are those cards on which both right and left sides have entries. These would be looked on as more of an area occupied by mobile forces, the permanency of which may be somewhat measured by the number of months incidents are recorded.

At any rate all this explanation culminates in one fact: Man and machine can be saved by a good S-2 staff.

FIGURE 3

AIRCRAFT THREAT/INCIDENT CARD SYSTEM ANALYSIS

SA ONLY	AW ONLY	AA AND AAA	NO FIRE	# MONTH	# INCID		SA ONLY	AW ONLY	AA AND AAA	NO FIRE	# MONTH	# INCID		SA ONLY	AW ONLY	AA AND AAA	NO FIRE	# MONTH	# INCID

Airborne Command Post

Large airborne operations require a flexible communications platform that allows the commander to see where the action is and direct air and ground activity to suit the tactical situation

Captain Richard Hawkins

WHEN ONE THINKS of battles of the past, he envisions a commander astride his white charger, surrounded by aids and messengers, observing from a convenient hill as masses of men maneuver clumsily below. His hopes of influencing the action depend on his view and the speed and efficiency of his messengers. During times when there were no convenient hills or when the visibility was poor, you can well imagine that more than one of these commanders prayed either for luck or for a horse with wings.

Today, commanders and staff officers need not pray for a horse with wings—they already have such animals available. The UH-1 Huey, equipped with a communications facility, provides them with every facility to operate an airborne command post.

Each commander knows that the command and control helicopter is available to him. But too many do not know what makes up the communications central AN/ASC-10 and AN/ASC-11 (the two communications consoles available to the commander and the normal control parties—both U. S. and ARVN). Nor are these commanders aware of the normal capabilities and limitations of the command and control helicopter.

The AN/ASC-10 is made up entirely of airborne radios which give the commander a variety of radios in a relative compact area. The dimensions are 32½ inches long, 17½ inches wide and 33½ inches high and weighs approximately 211 to 280 pounds (according to the type of voice security equipment installed in the console).

The radios associated with the AN/ASC-10 are two *AN/ARC-54* FM airborne radios which are the commander's tactical air-to-air and

The front and top views of the ASC-10 are duplicated in this mockup used in training

air-to-ground radios. They have a frequency range of 30.00 to 69.95 MHz which gives the commander the capability to select any one of 800 channels. The two AN/ARC-54s can be interchanged with AN/ARC-131s, providing a frequency range of 30.00 to 75.95 MHz.

The second type radio available is the *AN/ARC-51* BX UHF airborne radio which provides air-to-air and air-to-ground communications over UHF with a frequency range of 225.00 to 399.95 MHz. This allows the commander to select any one of 3,500 channels. The AN/ARC-51 BX can be replaced with an AN/ARC-73A VHF-AM airborne radio over the frequency range of 116 to 149.95 MHz, with 680 channels available (transmit) and 108 to 151.95 MHz with 789 channels (receive). Note: Provisions are not provided for the AN/ARC-134. The AN/ARC-51 BX can be replaced with an AN/ARC-73A VHF-AM radio. The type mission of the command and control helicopter will dictate which radio should be utilized.

The third type radio is the *AN/ARC-102* HF-SSB radio which provides long range, high frequency communications with a frequency range of 02.000 to 29.999 MHz, allowing the commander to select any one of 28,000 frequencies. The AN/ARC-102 HF-SSB radio used in conjunction with the AN/ASC-10 is an organic radio of the aircraft with the receiver-transmitter installed in the rear compartment of the helicopter.

Along with the radios mentioned above, the commander has six *C-1611/AIC* intercommunications panels which allow the control party to use the avionics facilities of the AN-ASC-10 at its discretion. The C-1611/AIC capabilities include an intercom, private intercom between two or more members of the control party, and provides individual control of the console radios, with a standard configuration being position 1-FM1, position 2-FM2, position 3-UHF or VHF and position 4-HF-SSB. (The positions are different from the standard configuration used with the aircraft radios.) The pilot and copilot also can transmit on the AN/ASC-10 by means of a PTT (push to talk) switch on the console connector plug.

Installation and maintenance of the AN/ASC-10 are performed by a supporting avionics detachment.

Prior to each mission all radios must be given an operational check and each member of the control party who is not familiar with the equipment must be given a briefing on the operation of the console.

In the event the command and control helicopter is forced down in enemy terrain, every effort should be made to remove the entire AN/ASC-10 console or the individual radios from the console and destroy them by the best means available.

The AN/ASC-11 is composed of two FM vehicular radios plus the aircraft's organic high frequency, single side band radio.

The dimensions of the AN/ASC-11 console are 30 inches high, 26 inches long and 24 inches wide and weighs approximately 225 to 305 pounds (according to the type of voice security equipment used with the console) which makes it somewhat larger than the AN/ASC-10. The radios associated with the AN/ASC-11 are two *AN/VRC-46* FM radios which have a frequency range of 30.00 to 75.95 MHz affording the commander the capability to select any one of 920 fre-

quencies. With the AN/ASC-11, the AN/ARC-102 high frequency, single side band radio is organic to the aircraft with the receiver-transmitter unit located in the helicopter's rear compartment.

The components mentioned above are for one AN/ASC-11 console; however, it is possible to have a double installation of the AN/ASC-11—that is, two consoles installed side by side in the aircraft. With the double installation of the AN/ASC-11 there are four *AN/VRC-46* FM radios and one AN/ARC-102 HF-SSB radio. The two consoles are interconnected and intercom is provided for all members of the control party. It should be noted that the AN/ARC-102 is switched into the circuit in place of FM-2 on the console by means of a toggle switch. Each AN/ASC-11 has three *C-1611/AIC* intercommunications panels, two on the front of each console and one on the rear. With the double installation there are six *C-1611/AIC*. The capabilities of the C-1611/AIC are intercom, private intercom between two or more members of the control party, and provides individual control of the console radios. The standard configuration of the C-1611/AIC associated with the AN/ASC-11 are position 1-FM1, position 2-FM2 or HF-SSB, position 3-FM3 and position 4-FM4.

The maintenance of the AN/ARC-102 HF-SSB radio is performed by a supporting avionics unit. Radio maintenance of the AN/VRC-46 FM radios is provided by the organic signal support.

Prior to each mission the commander must make operational checks of all radios and also insure all members of the control party are familiar with the operation of the AN/ASC-11.

As with the AN/ASC-10, the entire -11 console or the individual radios from the console should be destroyed if there is any chance they will fall into enemy hands.

The AN/ASC-11 was designed primarily so the maintenance could be performed by organic signal support rather than avionics signal support.

A new alternate to the AN/ASC-10 is the AN/ASC-15. It is very similar to the AN/ASC-10 except it is normally supplied with three AN/ARC-131 UHF-FM radio sets with complete provisions for voice security. Also, provision for HF-SSB is not provided, however, provisions are provided to interchange the third AN/ARC-131 with an AN/ARC-51 BX or AN/ARC-73A. The AN/ARC-131 can be replaced with AN/ARC-54s.

Tentatively for the future, an AN/ASC-15 is planned which will consist of three AN/ARC-114 VHF/FM radio sets with provisions for voice security equipment. One AN/ARC-114 will be capable of being interchanged with an AN/ARC-115 VHF-AM or AN/ARC-116 UHF-AM radio set. Three operator positions with intercom provision will be provided. These radios are the latest standard lightweight avionics equipment (SLAE) just introduced into the field. The frequency ranges for the AN/ARC-114 and AN/ARC-116 are identical to the AN/ARC-131 and AN/ARC-51 BX respectively. The AN/ARC-115 cover the frequency range of the AN/ARC-73A transmitter.

The side of the ASC-10 which faces the cockpit is shown on this training aid

Airborne Command Post

The U. S. and ARVN control parties are primarily concerned with these radios. The U. S. control party normally is comprised of the airmobile force commander, an airmobile force operations officer, an artillery liaison officer (should coordinate only, not adjust fire during fire missions), an air liaison officer, an aviation element commander, an aviation element operations officer, a crew chief and gunner and possibly the higher unit commander or members of his staff.

The ARVN control party normally consists of the ARVN airmobile force commander, a senior U. S. advisor, an artillery advisor (either U. S. or ARVN), an air liaison officer, an aviation element commander, an aviation element operations officer, a crew chief and gunner and frequently an interpreter, a higher unit commander and additional staff officers.

Each of the control parties has numerous members and, due to aircraft limitation and operations in areas that have high density altitudes, the commander cannot have a complete control party, so he must choose its members on a mission essential basis.

The capabilities of the command and control helicopter are infinite. When controlling ground units initial coordination can be accomplished on the ground in an assembly area. Control can be maintained through troop ships enroute, and normal command nets can be utilized after landing.

While controlling aviation units the commander can coordinate the aviation unit with the prestrike, insuring the aircraft will land in the proper landing zone by directing the landing zone marking, or diverting the aircraft to alternate routes or landing zones if required.

The commander also can coordinate the fires of attack helicopters, ground support fires and tactical air.

Instructors at the U.S. Army Aviation School use mockups of radio consoles in demonstrations. Above, an instructor points to the front of the ASC-11

Another capability of the command and control helicopter is called a special mission which is a catch all (any mission not covered by the units standing operating procedures).

Although the command and control helicopter has an infinite number of capabilities the commander must realize there are limitations, the greatest are imposed by weather. In marginal weather the command and control helicopter must fly at lower altitudes, thus increasing its vulnerability to ground fire. Also, because the command and control helicopter is flying below its normal altitude, it increases the volume of traffic in the immediate area of the landing zone, thus hampering the aviation unit in supporting the ground unit and increasing the chances of midair collisions.

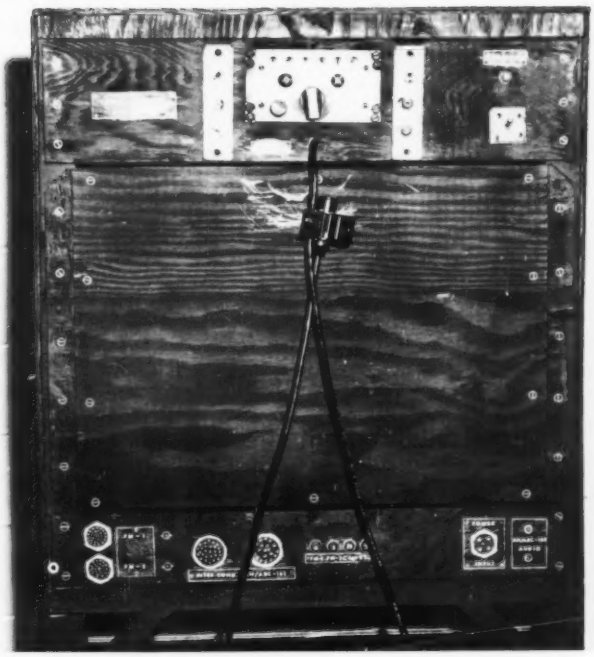
The endurance of the helicopter is another limitation. The number of control party personnel will limit the amount of fuel the aircraft can carry. When calculating on station time use the maximum fuel consumption of the aircraft.

Other limitations include limited space and facilities aboard the helicopter (as compared to the war room type command post) and the vulnerability of key personnel in the control party. The latter has double meaning: first, the commander should not have all of his key personnel in the control party; and second, all members of the control party should have alternates who are abreast of the situation.

The flight techniques of the

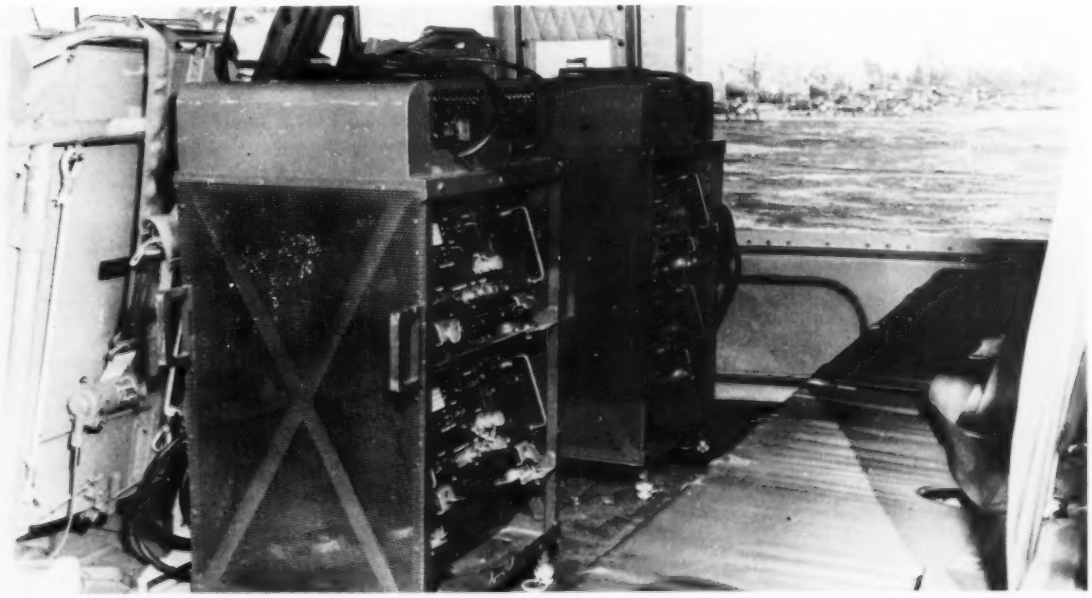
command and control helicopter are critical in the sense that the key observer of the control party must be in visual contact with the ground forces at all times. To accomplish this the command and control helicopter should make turns of approximately ¼-mile radius, keeping the key observer on the inside of the turns. The command and control helicopter should fly at an altitude between 1,500 and 2,500 feet absolute. Below 1,500 feet the helicopter is vulnerable to ground fire and above 2,500 the control party cannot accurately observe ground action.

The command and control helicopter provides the commander with a command post that he can station anywhere he feels necessary to influence the action. It also provides him with the communications facilities necessary for complete control. Your knowledge of this equipment will enable you to insure that its capabilities are utilized to the utmost.

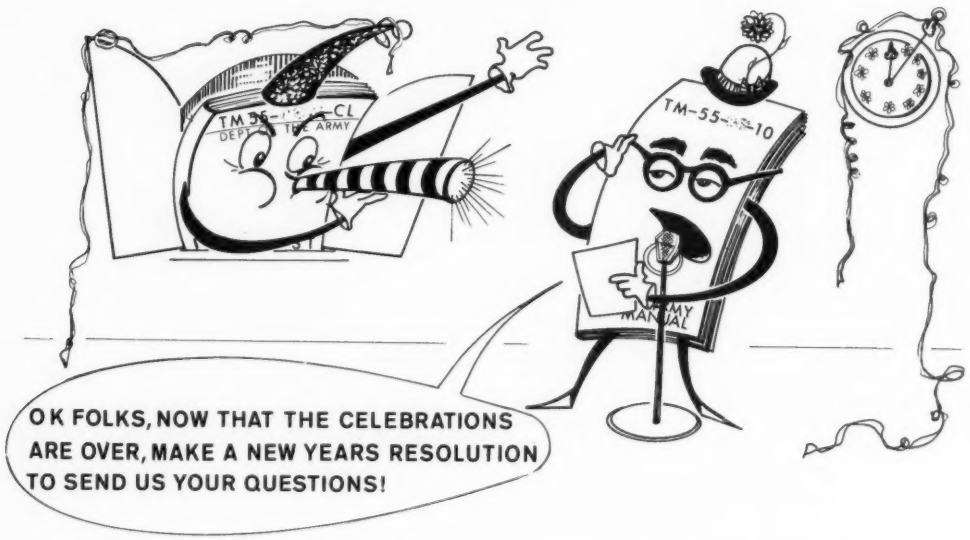


The back view of the ASC-11 mockup used in training at Ft. Rucker, Ala.

This prototype of the ASC-11 (dual installation) was used by the 11th Air Assault



Charlie and Danny's Write-In


TM 55-1510-212-CL
DEPARTMENT OF THE ARMY
TM-55-1510
ARMY MANUAL
OK FOLKS, NOW THAT THE CELEBRATIONS ARE OVER, MAKE A NEW YEARS RESOLUTION TO SEND US YOUR QUESTIONS!

WHEN WAS the last time you took a good look at the inside of a dash 10 manual? Yesterday? Last week? Never? If you haven't done any reading in your manual for a spell, why haven't you? You say it's lost its appeal, huh? We're looking for ideas on how to make the manual more appealing and useful to Army aviators. Charlie suggested a full color centerfold from Hugh Hefner's collection. However, the centerfold might be the only page looked at then. If you have any ideas, pick up a pen or pencil and give them to us. Your letters or postcards do not have to be fancy, formal or typed. Just scribble a note and if it concerns the dash 10 or CL, we guarantee you an answer.

★ ★ ★

Dear Charlie: We Starch-Wingers at Ft. Stewart were dismayed to learn in your October issue that the T-41B did not have a dash CL published. Please be informed that TM 55-1510-212-CL dated April 1969 has been in our hot little hands since way back last summer.

CPT D. L. S.

Charlie's answer: Well, David, you're partly right but not completely. The checklist which you have would be the DA checklist if the logistics support plan for the T-41 provided for DA checklists. However, it does not and if you'll take a close look at the cover page you will notice that it says "United States Army Aviation School" instead of "Department of the Army." For those off-the-shelf training aircraft which do not have DA checklists, the Aviation School has produced them in the prescribed format for student training. We have high hopes that any future off-the-shelf procurements will have provisions for both a DA checklist and dash 10.

★ ★ ★

Dear Charlie and Danny: Just got my hands on change 1 to the UH-1D/H (May 1969) operator's manual and the new CL. Page 3-9 (dash 10) shows six steps for BEFORE TAKEOFF AND LANDING while page N-9 (CL) gives only five steps. Which one is correct?

CPT R. F. K.

Charlie's answer: Caught us in a boo-boo this time! The CL is correct in this case. The dash 10 will be corrected to show only five steps.

★ ★ ★

Dear Charlie: Where can I get a new "FLIP checklist" for the U-6A? The one I've been using was issued at Ft. Rucker in 1967 and it's worn out. The latest DA checklist that I have been able to find is dated July 1965, and it's an "odd ball" size that

won't fit the plastic inserts of TM 1500-1.

H. K. V.

Charlie's answer: The "FLIP checklist" is not authorized and is no longer produced by USAAVNS. A new operator's manual (dash 10) and pilot's checklist (CL) is now at the printers and should be in distribution this month.

★ ★ ★

Dear Charlie and Danny: Don't get me wrong, like I'm not really just trying to knock a good product, but I tried to find the operation of the CH-47B fuel crossfeed the other night in the dash 10 and I never did find it. I know it must be somewhere in the book. As a matter of fact the standardization IP here was also stumped on where to find it.

WO1 C. B. R.

Charlie's answer: Fuel crossfeeding is covered in chapter 9 on page 9-3, paragraph 9-30. Often times in the more complicated aircraft handbooks, systems description is amplified in chapter 9, Systems Operation.

★ ★ ★

Dear Charlie and Danny: I'm confused about how high I can go in the CH-47C. I've always heard that 15,000 feet is the limit but after looking at the airspeed limitations charts (chapter 7 of the dash 10 and the performance section of the CL) it looks like I could go as high as 17,000 feet. Confidentially, I doubt that I'll ever go that high anyway.

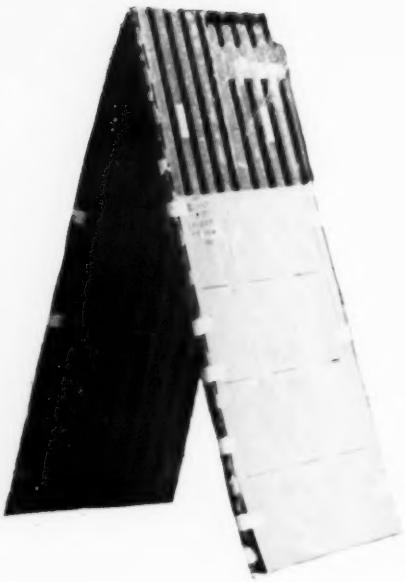
CW2 N. M. O.

Charlie and Danny's answer: The answer is in the dash 10, page 7-14, paragraph 7-69. It reads, "Maximum pressure altitude is 15,000 feet because of flight control hydraulic pump cavitation." The charts you referred to show a maximum density altitude of 17,000 feet. A temperature of −4 degrees C at 15,000 feet pressure altitude gives a density altitude of 17,000 feet.

★ ★ ★

Dear Danny: From the looks of things out in the field and from talking to numerous aviators I feel that it is time for someone to come up with a strong statement on the correct procedures to be used for climbout in the U-8 type aircraft. The dash 10 and the dash CL both agree on 3200 rpm and give appropriate power (MP) settings for climbs up to most any altitude. Yet in the field there are many, many aviators who insist on 3000 rpm and 40 inches MP for climb, even though none can come up with a chart or information pertaining to an overboost at this power setting. So how about coming up with some definite statements directed toward these old professionals who do not believe in the dash 10s, and with some luck maybe it will get to some of them.

Danny's answer: At one time, many years ago, the recommended climb power setting for the U-8 was 3000 rpm and 40 inches Hg. At altitudes up to approximately 3,000 feet this power setting did not provide for operation of the power enrichment valve. This caused high cylinder head temperatures (in areas not indicated by temperature gauges) and decreased engine life. The power settings recommended in the operator's manual assure the proper fuel ratio for climbs under all conditions, give better engine performance and provide for long engine life. For these reasons, true professionals adhere to the recommended power settings given in the operator's manual.



QUICK AND DIRTY

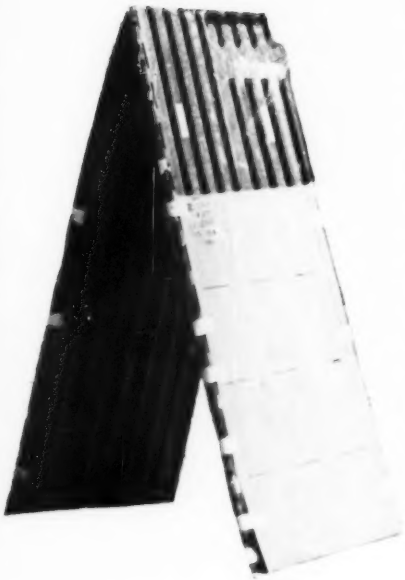
The Corps of Engineers has been building A-frame structures fabricated from solid plank steel landing mats. Numerous tests were conducted at Camp Shelby, Miss., to determine if these structures rebuff fragmentation from enemy mortar and rocket fire. They are placed around parked aircraft and soon will be in use in the Republic of Vietnam to protect one of the most valuable assets the Army has . . . its helicopters

AIRPOWER'S magic carpet may soon be serving as a magic shield. Landing mat, which has provided emergency landing fields since World War II, is now being tested as a "quick-and-dirty" protective device for parked aircraft in the Republic of Vietnam.

The helicopter has proven to be a highly effective offensive and defensive weapons system as well as a means for rapid troop and equipment transportation. The parked helicopters are valued targets for enemy units and the object of many damaging and costly small arms, mortar, rocket, and even satchel charge attacks by the enemy. The cost of a new Army helicopter starts at a quarter of a million and ranges upwards to two and one-half million dollars.

The Corps of Engineers is seeking a protection system for parked aircraft in forward areas that can be constructed and placed with a minimum of engineering effort out of materials on hand regardless of the terrain or combat conditions. The task of providing expedient protective measures is assigned to the U. S. Army Engineer Waterways Experiment Station at Vicksburg, Miss. As part of its mission, this unique engineering complex conducts weapons effects research, with emphasis on nuclear weapons, and designs and tests expedient surfacing materials for roads and airfields.

Field tests for near-miss protection from fragmentation were conducted at Camp Shelby, Miss. For-



old standard item is promising. Landing mat fits the "quick and dirty" category. A large quantity of solid plant steel mat already has been procured and shipped to Vietnam for use as runways for quick construction of landing fields for aircraft. A minimum of engineering effort is required to cut the standard 12-foot-long sections in half, invert the pieces to form A-frames, and place them around the parked aircraft. These will stop perhaps as much as 75 to 80 percent of the fragments at 30 feet—a significant amount of protection from a simple construction effort out of readily available material.

Bins now used in Vietnam are constructed out of metal or plywood, filled with native soil, and

protection for parked aircraft

eign rounds, representative of those threats encountered in Vietnam, and American rounds were fired for comparison. Fragments were captured in fiberboard boxes to determine fragment sizes and velocities at various ranges.

For the fragmentation tests, large and small vertical billboards and screens were arranged at various distances from prepositioned mortar and rocket shells. The rounds were fired remotely to produce the fragment density distribution at various ranges. Each round has its own unique footprint or spray pattern.

Concurrently with the fragmentation tests, materials tests were in progress to accumulate data on the effectiveness of ballistic nylons, plywood, concrete and soil bin revetments.

Although all of the results have not been analyzed, new use for an

placed to surround parking areas. The materials testing program revealed that the thickness of these bins could be cut from the current 5-foot thickness to only one foot without reducing the effectiveness of the protection. The thin-wall design would make a tremendous difference in the engineering effort required to build and fill the bins.

Another phase of the research program is now in progress to design and test covered shelters which would afford direct-hit protection.

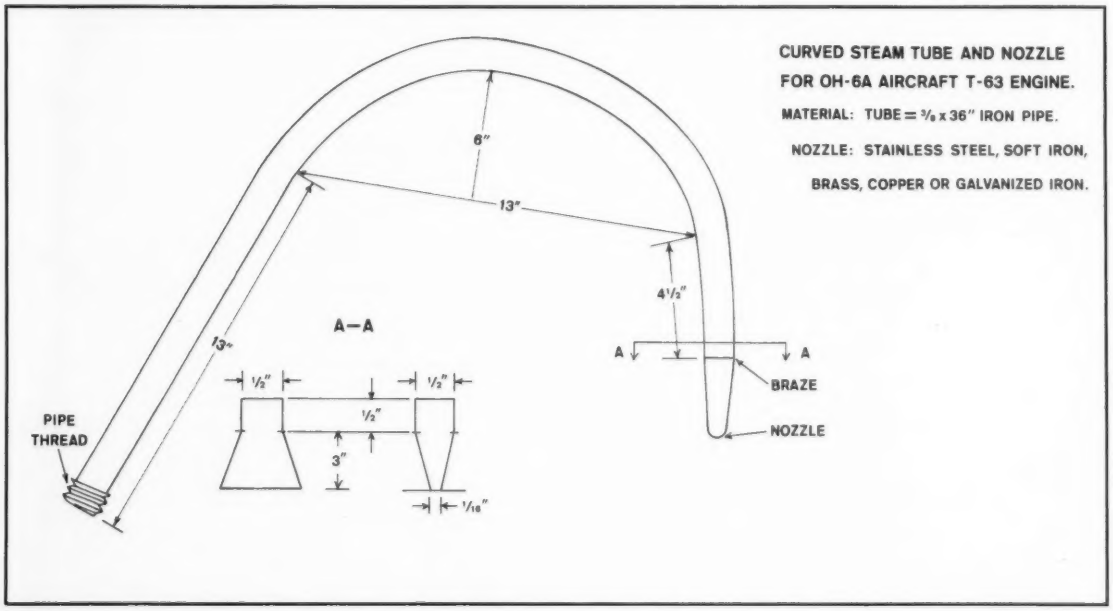
Soon military commanders in Vietnam will receive manuals to use for guidance in establishing near-miss protection devices. This certainly will help keep the mobility of the United States Army higher than that of any land force in history by protecting the equipment that makes it the fastest moving Army in the world.

Maintenance

FUTURE ISSUES of the AVIATION DIGEST will contain a feature entitled *Maintenance Matters,* which will be compiled in cooperation with the Department of Maintenance Training, USAAVNS, Ft. Rucker, Ala. If you or your unit have found a better, safer or more efficient method of getting the job done in the areas of aircraft maintenance, shop safety, POL handling or related areas of interest, send your tips direct to the U. S. ARMY AVIATION DIGEST, Ft. Rucker, Ala. 36360. The items for this month's *Maintenance Matters* were gleaned from the 34th General Support Group's excellent monthly maintenance newsletter.

OH-6A Engine Cleaning Tool

The compressor of the T-63 engine can be cleaned rapidly and thoroughly with the use of a steam cleaner and curved steam tube with nozzle that is attached to the standard steam cleaner nozzle. The curved steam tube can be placed through the air filter access in direct line to the compressor opening. Prepare the engine compressor for cleaning by following instructions outlined in TM 55-1520-214-35. Removal of the engine combustion chamber drain valve will drain steam and water rapidly during the cleaning operation. Replace the drain valve after the cleaning process has been completed.



Matters...

Approximately 30 seconds of steam into the compressor followed by 30 seconds of hot water flush will be sufficient to clean the compressor. The advantages of the curved steam tube is to protect the mechanic from being struck by the main rotor as the engine is being motored and provide a direct pressure of steam and water into the compressor. The figure on page 28 shows how to manufacture your own.

T-53 Engine Pubs

Seems a bit of clarification is necessary to establish the precedence of TMs used to determine the correct maintenance level for repair parts and special tools for the T-53 engine. When doubt exists, the engine manual TM 55-2840-229-35P is the correct authority. This TM supersedes those portions of TM 55-1520-210-35P applicable to engine and engine special tools.

OH-6A Hot Starts

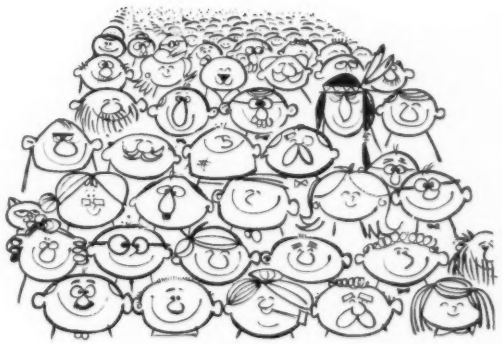
It has been reported that many units in RVN are experiencing severe hot starts where EGT reaches 1,000 degrees F or above. The most common reason is weak batteries. Either they are not properly charged because of lack of maintenance or the flight time between field locations is too short to recharge the battery.

Use a portable APU whenever possible for starting and maintenance personnel must keep a close watch on battery maintenance.

A Little Careless Wear

OH-6A helicopters are being received from using units with damaged ground handling lugs and bowed skids. In most cases, the damage was caused by ground handling wheels not being properly seated in the retaining lugs. During ground handling operations the wheels are disengaging from the skids, breaking the lugs and in some cases causing sheet metal damage. Recommend maintenance personnel and crew chiefs be instructed to insure that ground handling wheels are properly seated in the retaining lugs. All OH-6A ground handling lugs should be inspected for damage.

. . . to everyone



Cowboys' Lament

Two recent AH-1G accidents involved an inflight rotorhead separation caused by mast bumping. A teardown analysis of all components which could have caused this failure revealed no deficiencies. The conclusions reached based on eyewitness reports were that the pilots flew the aircraft into unusual flight modes. One unusual flight mode which will possibly cause mast bumping is described and prohibited in Change 4, TM 55-1520-221-10, flight at or below zero "g." Cowboying aircraft is always dangerous. In the AH-1G it is deadly. Don't horse around with the Cobra, it ain't no mustang!

Functional Test Flight

(of the UH-1)

Unlike the experimental test flying, the functional test flight does not get into engineering evaluation. Rather, it concentrates on a straightforward test of the systems operating under normal conditions

Major William E. Volk

A FUNCTIONAL test flight of the UH-1, like a trip to the corner drugstore, should not be a venture into the unknown.

The functional test flight differs from normal mission flying in that the pilot is flying according to a specific plan designed to test all functional systems and determine if any operational discrepancies exist. It differs from experimental test flying in that the pilot should never be in any uninvestigated realms of flight with his aircraft. Everything a pilot does during the flight should have been done many times before by other test pilots under similar conditions.

It is never necessary to exceed the published limitations during a functional test flight because it is not an engineering evaluation of flight performance. Instead it is a straightforward test of the helicopter and its systems operating under normal conditions. A test pilot never should run through a series of severe maneuvers with his aircraft and consider it in good condition if it holds up during flight. This is dangerous and inconsiderate to those who are expected to fly the aircraft after the test flight.

Extremely rapid pedal turns, rough control, operating the engine at higher than normal power, operating above maximum allowable airspeeds and excessive operation with abnormal vibrations contribute to premature malfunctions of various aircraft componets.

There is no excuse for a "sick" aircraft and no reason for such an aircraft to be cleared for flying. No mechanic or maintenance officer should allow this type of aircraft to be flown, especially in a combat situation like that found in the Republic of Vietnam. Many accidents listed in the accident record books as pilot error can be traced to this type aircraft being cleared for flight by maintenance supervisors.

The normal test flight procedure consists of a check of the entire aircraft. Before takeoff, the pilot should complete the preflight and, although one pilot can accomplish the test flight in a UH-1, another crew member should be present to assist in recording data during flight. Although a test flight consists of many checks and determinations, some of the more important ones should be closely observed and recorded.

After the aircraft has been run up set the governor rpm at 6600. Check the torquemeter reading. A reading of 10 to 15 psi is normal—a higher reading indicates that the autorotation rpm is set too low.

Prior to hovering, check the response of the tip path to cyclic input and the response of the ship to tail rotor pedal inputs. When lifting to a hover, raise the collective slowly and feel the center of gravity. Note a smooth power increase and check for surges or other abnormal engine indications. Check the controls to determine if they are in normal positions at a stable 5-foot hover. Then taxi to the hover test area.

Make hovering turns in both directions and do sideward and backward flights to check the pedal and cyclic response. Rapidly move the cyclic forward and backward several times at about a one-per-second rate. Then hold in neutral and feel the pylon rocking. The rocking

should dampen out and be stopped in four or five cycles. Check each individual hydraulic cylinder and irreversible by moving the cyclic along a 45-degree line from the left rear to the right front and feel that the cyclic doesn't tend to get stiff after one or two movements. Similarly, check it along a line from right rear to left front.

Caution—should cyclic jam or get hard to move during this check turn hydraulics off, then on. Total cyclic movement should be about 6 to 8 inches at a rate of about 2 or 3 seconds per movement. If too rapid, it is possible to cause the same reaction that would occur with a hydraulics failure. One hand or the observer's hand should be kept on the hydraulic control switch to immediately turn hydraulics off and on again if necessary.

Make a normal takeoff and climb out at 60 knots. This gives the aircraft a good airspeed and keeps the collective pitch from being extremely high in case of an engine failure. After gaining sufficient altitude, make an autorotation at 60 knots to check rotor rpm and to make sure enough right pedal is available. Make a power recovery and climb back to operating altitude.

After reaching a safe altitude and over a location giving the best possible autorotation areas, increase the power to the torque limit or maximum power available. Check that rpm does not droop or gain more than 50 rpm during slow power increase, then droop N2 from 6600 to 6400. Check N1, then droop further by increasing collective to 6200. Then re-check N1. If N1 has changed, the droop cam is out of adjustment. Check to see that a sufficient amount of left pedal remains. Record the N1, the EGT, the torque and the OAT for later power computation and comparison with the specified power for the engine.

Check control positions in flight at 100 knots using 30 to 35 psi torque. The cyclic should be nearly centered laterally, the pedals should be aligned on standard B models or the right pedal ½ to 1 inch forward of the left pedal on the D model.

Make turns to the left and right to check control response and stabilizer bar action. Correct bar action can be noticed by a tendency for bank oscillations and by smooth roll into and out of the turns.

Fly at different altitudes and airspeeds and check all flight instruments. Check all radios and electronic gear that can be checked.

Make a normal engine shutdown and complete the test flight by making required entries in the aircraft forms and the functional check flight list.

The following conversation is taking place
Vietnam. The two participants are a brigad
troop.

Operations officer: Sir, my cavalry troop
to go to work.

Brigade S-3: Fine, captain, I have your
craft to report to the brigade S-4 and start
which I want your gunship aircraft to work
and control missions placed with the units

Operations officer: Sir, those missions ar
to perform reconnaissance operations, not

Brigade S-3: What? Do you mean that y
gave you?

Operations officer: No, sir, I mean that
and using the troop in that manner would

Brigade S-3: In that case, I'd like for yo
the brigade's area of operations. How soon
that area?

Operations officer: Sir, the rifle platoon
be much more efficient to use the aero sco
cover the ground much faster.

Brigade S-3: Hell, captain, I thought you
do is argue.

Air Cavalry

Captain Th

THE CONVERSATION above would not have taken place if there had been a proper understanding of air cavalry employment.

Although the original air cavalry concept is now over 10 years old, its proper employment techniques are still often misunderstood. To help offset this, I will briefly describe the mission and authorized makeup of an air cavalry troop of an air cavalry squadron and that portion of the authorized makeup that can be utilized on a daily basis. Then I will point out the major misuses of air cavalry assets and the most productive method of employment of air cavalry.

First, the mission of the air cavalry troop as stated by FM 17-36 (Divisional Armored and Air Cavalry Units) is to extend by air the reconnaissance and security capabilities of units to which it is attached; to engage in offensive, defensive or delaying actions; and to seize and dominate lightly defended areas or terrain features.

To perform this mission, the air cavalry troop has a headquarters section, aviation section, maintenance section, aero scout platoon, aero weapons platoon and an aero rifle platoon. If one of these had to be designated as the most important or valuable asset I would select the aero scout platoon.

The aero scout platoon consists of 19 enlisted men and nine officers. It is commanded by a captain. The platoon has 10 assigned OH-6A light observation aircraft, each manned by a crew of three.

Each OH-6 is armed with one 7.62 minigun and has an average station time of one hour and 45 minutes.

The platoon's primary mission is reconnaissance which is performed by at least two aircraft. This is to afford mutual support

in a tactical operations center in the Republic of
de S-3 and the operations officer of an air cavalry

has now closed your location and we are ready

missions all lined out. First, I want your slick air-
hauling supplies; second, this is the list of units
k with; also, I want scout aircraft for command
on this list. Any questions?
re not acceptable. We were sent here by division
general support missions.
you're not capable of performing the missions I

we were not designed for a general support role
be extremely wasteful.
ou to check out an area in the southern portion of
can you have your rifle platoon on the ground in

could be ready to go in five minutes, but it would
outs first to see what's in the area since they can

u were ready to go to work, but all you want to

Employment

omas P. Barrett

and confirmation of the gathered information. The reconnaissance missions are performed at an average altitude of 50 feet and at airspeeds up to 50 knots. I believe armed helicopter escort is desirable since the slow airspeeds at which the scout team operates make it extremely vulnerable to ground fire. In our unit the scout platoon was expected to have an average of 60 percent of its authorized aircraft available with mission-ready crews on a daily basis.

The aero weapons platoon has 11 enlisted men and 20 officers. It is commanded by a captain. The platoon has a threefold mission: (1) supporting the troop with armed escort, (2) target destruction and (3) support of the aero rifle platoon.

In my opinion the mission that takes most of the weapons platoon's flying time, if the troop is properly employed, is armed escort of the aero scouts.

The aero weapons platoon's assigned aircraft is the AH-1G Cobra which is armed with the 7.62 minigun, the 40 mm grenade and 2.75-inch rocket. The aircraft has a limited low level reconnaissance capability due to its configuration and has an average station time of one hour and 45 minutes. In my unit the aero weapons platoon was expected to have 60 percent of its authorized aircraft available with mission-ready crews on a daily basis.

The aero rifle platoon consists of an infantry platoon and a lift section. The infantry platoon is authorized four 9-man squads, two radio-telephone operators, a platoon sergeant and a captain commander. The weapons and organization of each squad is similar to that of an armored cavalry troop.

The aero rifle platoon has two

1st Cav Division troops jump into the assault from a UH-1D

primary missions: security of downed aircraft and limited reconnaissance. Our platoon had 28 personnel including the commander as an average daily fighting strength.

To place the aero rifles into battle there is an assigned lift section of five UH-1H helicopters, each with a crew of four. The UH-1H is capable of lifting eight combat-equipped troops and has an average station time of an hour and 45 minutes. As a minimum, four out of the five UH-1Hs can be expected to be available daily.

The troop commander is a major located in the headquarters section. He has an operations section headed by a captain, found also in the headquarters section.

The aviation section has two UH-1H helicopters assigned, one for command and control and one for maintenance. These aircraft also can be used for troop lift.

The maintenance elements of the troop are capable of pulling all necessary maintenance functions on all equipment up through engine change on assigned aircraft.

I feel the two major misuses of air cavalry in Vietnam are: first, employing air cavalry assets to bolster airmobile operations of supporting units; and second, using these assets in a separate role with no backup force.

Why not use the air cavalry's assets in the airmobile roles of troop lift, command and control and fire team support? The cav troop certainly has the aircraft for it. But this would be like taking an armored cavalry troop and using its organic vehicles to carry cargo and troops just because there were not enough 5-ton trucks available.

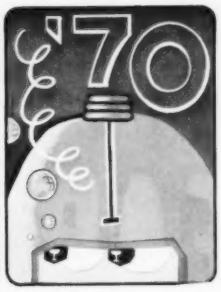
Assigning airmobile missions to air cavalry troops is most often found in a troop organic to a division. It seems that people at the G-3 level too often find the troop a convenient source of aircraft to fill division airmobile missions. So, instead of demanding sufficient assets to fill the missions from higher headquarters the air cavalry troop is farmed out to bolster these operations. This renders the troop totally ineffective in its primary role of reconnaissance. If you find yourself saying *so what?* ask someone from the 9th Infantry Division or the 1st Cavalry Division (Airmobile) if a loss of their air cavalry reconnaissance capability would have adversely affected operations.

My opinion is that the misuse of the troop in a separate role without a backup is most prevalent in the aviation group in Vietnam. In this role the air cavalry troop is placed under operational control of a division or a brigade size unit. This unit assigns a large portion of its area of operations to the troop for reconnaissance. But since there is no plan to reinforce the troop, the effectiveness of the small-sized aero rifle platoon in the reconnaissance role is extremely limited. This restriction often prevents the full development of the enemy situation and a loss of valuable information.

It is only fair to point out that this is not a total misuse of the air cavalry troop since it is employed in a reconnaissance role; however, it greatly limits the total aggressiveness and thus the productivity of the air cavalry troop.

Then what is the best way to employ the air cavalry? If you desire to find, fix and destroy the enemy, give your air cavalry troop the most active portion of your area of operations—the part you want developed. Then be prepared to reinforce the cavalry troop with a company size element, and that company with whatever reinforcement plan you now employ. Will this work? Is it worth tying up the necessary assets? Rather than bore you with page after page of after-action reports to answer those two questions, I again ask you to find someone with a 9th Infantry or 1st Cavalry Division patch and ask him. He can tell you for they both have used this method with unquestioned success.

VIEWS FROM READERS



Continued from page 1

from the field on a volunteer basis as to which new courses are needed are almost nonexistent. Ideally new courses should be the result of field request.

We send a special thanks to SFC Johnny J. Broussard for his fine letter and echo his request that you use courses already available and request new courses that would be most beneficial to you.

I've been taking AVN 15, 20, 27 and 57 and I need a pass to rest up

★ ★ ★

Sir:

I am writing in regard to the article "Gear Up" in *Tales from the Trojan,* AVIATION DIGEST, November 1969. The authors make the statement, "We manually pumped the gear into the up position." On the U-8 Beechcraft airplane this is impossible. The emergency gear system will only allow the pilot to *lower* the gear manually since the mechanical rachet linkup turns the gear torque tube one way.

This small comment is in no way intended to distract from the fine article or your outstanding publication. The AVIATION DIGEST magazine is a very important contribution to the Army Aviation Safety Program.

LTC John R. Dickinson
Simmons Army Aviation Command
Ft. Bragg, N. C. 28307

Sir:

I have just read "Gear Up" in the November DIGEST. Why did the author on takeoff roll at 50 knots, elect to "pull the column full back" and attempt flight rather than abort the takeoff? And after takeoff, with the indications of trouble he described, wouldn't it be wise to clean the airplane up as soon as practicable? The author accelerated to 120 knots, then raised the flaps followed by his attempt to raise the gear. My dash 10 says gear first then flaps. He stated that the nose and *right wing* dropped, yet on page 47, after feathering number *one* propeller, he discovered all three blades had hit the runway; and all this time I thought the right wing carried the number two engine.

1LT Charles H. Wedge
Hq, 1st Region ARADCOM
Stewart AFB, N. Y. 12550

• Good catch, gentlemen. According to the Chief, Publications and Graphics Division, USABAAR, it is fairly obvious that the author did several things he might well have changed, given the time and chance to review his dash 10. This hindsight should motivate all aviators to have more than a nodding acquaintance with the dash 10s for the aircraft they fly.

Certainly the whole episode could have been avoided had the pilot aborted his takeoff at the first indication of trouble. But since he elected to continue the takeoff, the next step should have been to raise his gear and then flaps as soon as practicable. With respect to the communications problems, the aircraft would have had to have been inverted to damage the VHF and omni antennas as alleged in the article. But the real cruncher comes in the authors' statement, "We manually pumped the gear into the up position." No provisions are made for manual emergency retraction of the landing gear. To sum up, the whole gaggle of errors narrows down to a certain safety factor installed by Beech which permits the gear selection handle to be in the up position and the gear to be down while on the ground. Was the position of the gear handle checked before takeoff?

★ ★ ★

• The 34th General Support Group tells us that the words "Support and Service With Valor" that appear on their new insignia refers to the unit having been awarded the Meritorious Unit Commendation for service in Vietnam.

The new insignia was designed by the U. S. Army Institute of Heraldry and consists of a red stylized wrench set vertically between a pair of black wings with two gold arrowheads. The wings are inclosed by two gold lightning flashes. Across the top and just below the wrench are red scrolls bearing the lettering in gold.

The lightning flashes refer to the unit's activation in Vietnam and their mission of aircraft maintenance is suggested by the wings and wrench. The arrowheads and flashes refer to supply and servicing of armament and electronics systems. The upright wrench further alludes to the unique mission of the 34th Group in that it is the first and only unit to provide aircraft maintenance and supply support to the U. S. and other Free World Military Assistance Forces in the Republic of Vietnam.

HAPPY NEW YEAR, HORATIO!

the following 28 pages prepared by the U.S. Army Board for Aviation Accident Research

Pierce Wiggin

Frozzleforth starts a fresh new year with a bright future

RESPLENDENT IN freshly pressed greens, his mustache waxed and combed to its full 8-inch spread, the self-acknowledged world's greatest aviator marched into the headquarters anteroom 3 days before Christmas and stopped before his CO's secretary. He clicked his polished heels together and bowed low over her desk, reaching for her hand. "Ah, June, what a lovely vision you are on a cold and dreary day. You brighten this post like a spring flower in the Arctic. What is that delightful scent you're wearing?"

His words brought a smile to her full red lips and her free hand rose quickly to fluff platinum hair. Tiny gold Christmas balls dangled from her ears as she shook her head and laughed up at him. "It's called *Seduction,* but don't let it give you ideas!"

He pressed his lips to the back of her hand and straightened, holding and pressing her fingers in his palms. "My dear, such beauty is wasted in this stuffy place! I, Horatio Frozzleforth, shall mount my white charger and rescue you promptly at the close of business! We'll dine by candlelight, with buckets of champagne, soft music and . . ."

"I'm sorry, major, but I have a date for tonight."

Frozzleforth flashed his white smile. "Of course you do! How could these moths of aviators ignore such a beautiful flame? But you must promise new year's eve to me. Brighten this dull day and tell me you'll attend the new year's eve ball with me!"

"I'd love to. Now you'd better give my hand back and brighten Colonel Hopewell's office with your presence. He said for you to come right in."

He leaned to kiss her hand again. "Until our night, ma cherie! I shall count the hours!" He released her hand, tore his eyes from her, strode to the door of the inner office and rapped his knuckles over letters that spelled *COMMANDING OFFICER.*

"Come in!"

Frozzleforth opened the door and walked into the colonel's office. He closed the door, marched to the desk, snapped to attention and saluted. "Major Horatio Frozzleforth reporting as requested, sir!"

"At ease, Horatio. Have a seat. Would you like some coffee?"

"Thank you, sir." Frozzleforth glanced around and saw four other officers as he took his seat.

Colonel Hopewell pressed a button on his intercom box and spoke into it. "Six coffees, June, and no calls, please. We don't want to be interrupted." He swung around in his chair and smiled at Frozzleforth. "Horatio, the Christmas spirit has gotten to us. That's why we're having this meeting."

"Christmas spirit, sir?"

"That's right. I was going over your record this morning and it occurred to me that the nicest thing we could do for the Army and you during this season of joy would be to get you straightened out and back on the right path."

"Right path, sir?"

"Can you hear me all right, Horatio?"

"Yes, sir!"

COMMANDING
OFFICER

HAPPY NEW YEAR, HORATIO!

"Then stop repeating my words! Yes, I said back on the right path. That's why I asked the flight surgeon, the chaplain, the operations officer and the maintenance officer to come in. We have devised a program that should make you into as good an officer and aviator as you have always believed yourself to be."

Frozzleforth's mouth dropped open and the ruddy color drained from his face. "But, sir! I—"

"No buts, Horatio! Would you like me to review your past accidents?"

"All materiel failures, sir, and shoddy maintenance! Why, only my superb flying—"

"Was it materiel failure that made you run out of fuel and clobber a Beaver? Was it shoddy maintenance that caused you to clip the general's commo wire with your tail rotor?"

Frozzleforth pushed down in his chair, shrinking as small as possible, while the colonel continued. "Was it superb flying that chased the airliner off the airway?" He stopped as his secretary rapped and entered.

She served their coffee quickly and left, followed by admiring stares as she drew the door closed.

Colonel Hopewell sipped his coffee and smiled at Frozzleforth. "Sit up and drink your coffee, Horatio. We're not here to embarrass you. We're going to help you." He opened a folder on his desk. "Here's our plan. As you know, the new year starts a week from Thursday. We have prepared a list of resolutions, based on your records and our observations. If you will agree to adopt them, you can start a fresh new year with a bright future."

"And if I don't, sir?"

"There's an opening for a liaison officer with the Navy's submarine fleet. I believe they're planning a cruise under the polar ice cap."

"May I see the resolutions?"

"Certainly." Colonel Hopewell handed the folder across his desk. "You'll note there are six copies, one for each of us. Read the resolutions and sign all six copies, please."

Frozzleforth opened the folder and read: "I, Major Horatio Frozzleforth, being of sound mind and body, do hereby resolve that from 1 January 1970 henceforward, I will:

1. *Cease smoking.*
2. *Limit my alcoholic intake to two drinks per evening, or none if I am to fly the following day.*
3. *Perform at least 30 minutes of exercise every day.*
4. *Get at least 8 hours sleep every night.*
5. *Conscientiously study the Operator's Manual for each aircraft I fly and carry and use approved checklists for all flights.*
6. *Always obtain current weather and devote at least 30 minutes of planning for each flight, more if needed.*
7. *Never exceed aircraft design limitations.*
8. *Not show off or boast about my flying.*

Frozzleforth raised his head and glared at the flight surgeon. "Season of joy, doctor?" he asked bitterly. Without waiting for a reply, he dropped his eyes and continued reading.

The color returned to his face as he read this resolution and he emitted a loud "Humph!"

9. *Always abide by all 95 series flying regulations.*

This brought another "Humph!"

10. *Devote constant attention to the care and safety of my crew and passengers.*

"Think you can live up to those, Horatio?" asked Colonel Hopewell.

"Sir, with my experience and stamina, these will prove child's play!"

"Careful, Horatio. You'd better read the paragraph just above your signature block."

Frozzleforth dropped his eyes to the paper and read: *If I am observed violating one or more of these resolutions by any of the five officers witnessing my signature, I agree to pay the sum of $100 for each resolution broken to the charity designated by the officer observing the violation.*

"But, sir!" Frozzleforth sputtered. This is blackmail!" He glared around at the other officers. "And you're all accessories!"

Colonel Hopewell's smile faded. He reached for his intercom. "June, get me the Officers' Assignment Division in Washington, please."

Frozzleforth reached into his blouse, jerked his pen out and began rapidly scribbling his signature on the six copies.

The colonel's smile returned and he pressed the intercom button again. "Never mind, June, cancel that call." He beamed at Frozzleforth. "Remember, Horatio, these go into effect at 1 minute after midnight new year's eve! Good luck!"

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Frozzleforth wheeled his white Jaguar into a wide drive and parked under an apartment house canopy. Stepping out, he shifted the plastic bouquet box he was carrying under his arm and flicked an imaginary piece of lint from the cuff of his dress jacket. He pushed through the glass doors, strode through the lobby to the elevator and pressed the UP button. Whistling and tapping his foot, he waited impatiently and leaped into the car as the doors whooshed open. He rose to the fourth floor and hurried along the thick-carpeted hallway to apartment 410. He touched the doorbell, squared his shoulders and spread his lips in a wide smile.

The door opened and June Ever, Colonel Hopewell's secretary, answered his smile. She wore a green form-revealing strapless evening gown with emerald earrings to match. "Major Frozzleforth! How handsome you are in that uniform! Come in."

He grasped her hand and raised it to his lips, while his eyes took appreciative inventory. "My dear, you're gorgeous! You'll be the belle of the ball! These poor petals can't possibly do justice to so much beauty," he said, passing the bouquet to her. "And please call me Horatio. I don't want to feel like your uncle."

"Oh, Horatio, red roses! It's just right for this dress." She opened the box. "Will you pin it on for me?"

Frozzleforth followed her into the room and took the bouquet and pin she offered. He surveyed her bosom and cleared his throat, "Ummm, where would you like it?"

"I think here in the center would be best, don't you?" She pointed to the indentation of the tight silky material.

"Ideal!" He placed the bouquet where she pointed and his nervous fingers fumbled with the pin.

"Here, let me help you." Her fingers met his and adeptly slid the pin into place. "There!"

She turned away and examined her reflection in a full length door mirror. "It's beautiful." Her eyes met his in the mirror. "Would you like a drink, Horatio?"

"I'd love one, my dear."

"There are bottles, ice and glasses on the kitchen table, through the door behind you. Help yourself while I go finish my face."

Frozzleforth watched her leave the room, turned about and walked through a swinging door into her small kitchen. His eyes brightened as they came to rest on the array of bottles she had prepared. He dropped ice cubes in a glass, selected the most expensive looking bottle and drowned the cubes with amber liquid. He lifted the glass to check the level, poured in more, sipped and smacked his lips. "Ah, Horatio, this is your night! Indeed it is!"

He was halfway through a second drink when she joined him.

"That looks good. Do I have time for one?"

"Of course, you gorgeous creature! Say the word and we'll stay right here and have a private celebration! I can think of—"

"Now, Horatio! You know we can't do that! Just fix me a short one. We'll have to hurry."

Frozzleforth poured her a generous portion and freshened his glass. He raised it to her. "Here's to a happy new year's eve, my love!"

She laughed. "Aren't you rushing things a little?"

"Not a bit! I was smitten when I first laid eyes on you! I intend to sweep you off your feet and make you my queen!"

"For now, sire, could you just sweep off that light and take me to the ball?"

He gulped the remainder of his drink, switched off the light and followed her from the kitchen. She brought a fur stole from the closet and stood while he wrapped it around her shoulders. His hands clasped her shoulders through the fur and he leaned down to plant his lips on a creamy area of skin behind her ear.

She giggled and shook free. "Horatio, your mustache tickles! You'll have to give me a chance to get used to it."

"Gladly, my dear! Would you care to practice now?"

She took his arm and urged him to the door. "Later, please. Try me around midnight, will you?"

"I shall indeed!"

With her hand at his elbow, Frozzleforth escorted her from the building to his car.

"Hey, you weren't kidding about the white charger, were you?" She pursed her lips and whistled admiringly. "What is it?"

"Just a little runabout I picked up on my last trip to the old country. You like it?"

"I'll say!" She stepped in, gathered her skirt through the door and settled back into the deep

leather cushions as he closed the door and hurried around to get in beside her. Her eyes moved over the shining array of gauges on the polished dash.

"Jaguar!" she exclaimed, reading the name. "I've never ridden in a Jaguar before!" She clasped his arm as he brought the engine to life, shifted gears and accelerated into the street. "Horatio, you're just full of surprises!"

Frozzleforth grinned and whipped around a police cruiser. "My dear, as they say, 'You ain't seen nothing yet!' " He inhaled her perfume in the close warmth and felt her press against his arm as he wheeled onto the expressway and sped toward the post.

Frozzleforth moved to the right lane, downshifted and slowed as they approached the Fort Remote turnoff. "We're almost there. Sure you don't want to test my mustache again before we get in the crowd?"

June squeezed his arm and leaned up to plant a quick kiss on his cheek. "That will have to do until later. For your information, it didn't tickle that time and I like your shaving lotion."

Frozzleforth turned into the main gate and drove to the officers open mess. He followed a line of cars to the entrance and stopped to help her out. "If you'll wait in the lobby, I'll park the car and be right with you."

He got back under the wheel, gunned ahead to the parking lot, found a space, parked and hurried back to join her. He checked her stole and his cap and they walked into the crowded ballroom.

"Horatio, it's beautiful!" Her eyes sparkled as they roamed over the huge room. Gaily colored balloons hung in clusters from the ceiling. Tables surrounding the glossy dance floor were covered with red cloths and each held an assortment of paper hats, horns and confetti. The sounds of orchestra members tuning their instruments on the bandstand could be heard over the babble of voices and laughter.

June drew hard stares from the evening-gowned ladies and admiring glances from their husbands as they moved through the crowd. Frozzleforth found an empty table and seated her as a waiter approached. "Can I get something for you, major?"

"Indeed you can, young man! Bring us champagne cocktails and keep them coming!" He watched the waiter hurry away, sat beside June and reached for his cigarette case. "You'll have to help me smoke these up before midnight."

"Why midnight?"

"I've decided to give them up for the new year. We aviators must stay in tiptop condition, you know!"

She accepted a light and watched him puff furiously. "Won't that be terribly hard to do?"

"Not for a person with my tremendous willpower, my dear. I've always maintained complete command of my body and mind!"

As the waiter returned with their drinks, the orchestra leader raised his baton and swept it down. Music swelled over the sound of voices and couples moved to the dance floor and took up the fast-paced beat. Frozzleforth gulped his drink, pushed his chair back and stood. "Come, my dear. I can't wait to hold you in my arms and show these clods how to appreciate true beauty!"

June smiled, rose and walked through the crowded dancers with him. She moved into his arms and he drew her close and whirled her. He had taken only three steps when he felt a tap on his shoulder, turned his head and looked at the smiling face of his CO.

"Good evening, June, Horatio. RHIP, you know," he said, drawing her to him. "My wife is at our table. I'm sure she'd love to dance with you, Horatio."

Frozzleforth watched them whirl away, turned and stomped from the floor. His eyes searched the tables and found the buxom Mrs. Hopewell. He shrugged his shoulders in resignation and walked to her. "Good evening, m'am. May I have the honor of this dance?"

"Why, Major Frozzleforth, I'd love to!"

He held her chair as she rose and escorted her to the floor. She bounced into his arms eagerly and began to lead him with enthusiastic leaps, jostling the other dancers. Frozzleforth held on to her grimly and attempted to match his strides to her unpredictable hops.

"Isn't this fun, Major Frozzleforth? You're a wonderful dancer!"

He forced a smile on his perspiring face. "Indeed it is, m'am! Thank you!"

The music came to a merciful end and he escorted her back to her table, thanked her and hurried through the crowd to claim June from Colonel Hopewell. He found her surrounded by admiring officers.

"Horatio, I'm having a wonderful time! You have the nicest friends!"

"Yes, my dear, but we mustn't detain them. I'm sure their wives are anxious for them to return to their tables." He glared at the group around her. "Isn't that right, gentlemen!?"

Bland smiles met his fierce glares and, as the music started, the flight surgeon drew June from the group and whirled her away. Frozzleforth hurried after them, broke, and was allowed four steps before another officer tapped his shoulder and claimed her.

His blood pressure at the boiling point, Frozzleforth trod to his table, gulped down his refilled cock-

tail and smoked furiously, staring as one officer after another danced with his date. His hand crunched a paper hat and he growled, "Happy new year!" When she failed to return to the table between numbers, he swallowed her drink and signaled the waiter for more.

He broke on her twice more during the next hour, with the same result. Many stags joined the throng that swept her from one pair of arms to the next in rapid succession. When he lost her the last time, Frozzleforth tromped from the ballroom into the bar, climbed on a stool and called for a drink. He downed it, slapped the glass on the bar and muttered, "Bah!"

"Beg pardon, sir?"

He turned his head and stared fiercely at the young captain next to him. "I said bah, captain! Is this any way for an aviator to spend an evening!? Is it!?"

"You're not enjoying the dance, major?"

"Enjoy this smoke-polluted atmosphere and bedlam of noise!?" He snorted. "How could any aviator enjoy this?" He shook his head and clenched his fists. "I need to be up in the clean fresh air, with these hands at the controls and my skill exercising a responsive aircraft through its paces!"

"You want to fly tonight?"

"What better way to bring in the new year than mastering the night sky, captain?"

"Yes, sir. If you say so, sir. Excuse me, please. I have to get back to my table." The captain walked to the door, turned to look back at Frozzleforth, shook his head and left the bar.

The idea of a night flight grew to a compulsion in Frozzleforth's mind as he downed more drinks. "By gads, I'll do it! I'll show these blighters a thing or two!" He pounded his fist on the mahogany surface, leaped to his feet and hurried from the bar.

His eyes found June on the dance floor as he made his way through the ballroom. She was still pursued by a waiting line of officers. Frozzleforth grinned wickedly and strode to the lobby to collect his hat. "A little buzz job at midnight will be just the thing to liven this place up! And who can do the job better than the world's greatest aviator!?" These were his thoughts as he trotted to his car and sped from the parking lot.

"What kind of aircraft?" he wondered, racing through the deserted streets of the post. "I'd best select one that's parked in a remote area. Don't want to raise the operations chaps until I get in the air. And one that makes a great noise. A good buzz job demands proper noise. There's a Beaver parked at the far end of the ramp and nothing gives a more satisfying noise than changing a Beaver's prop pitch at the right moment!"

He slowed as he approached the airfield and switched off his lights, staring into the darkness ahead. With the aid of dim building lights and the rotating beacon, he drove slowly to the hangar and parked behind it, got out and pushed the door closed with a barely audible click.

Frozzleforth paused beside the hangar and stared across the dark ramp. As his eyes slowly adapted, he could see the shapes of aircraft parked in rows. He crept out, walked softly and slowly to the end row, saw the Beaver he was seeking next to the taxiway and made his way to it. Stooping, he crawled under the stabilizer, untied the tail wheel, then hurried forward to release the wing tiedowns. He climbed the strut on the left side, opened the door and reached in to remove the control locks.

His eyes fell on the luminous dial of his wristwatch. The hands showed 15 minutes before midnight. "Gads, I'd better get airborne! No time for a preflight!"

He climbed in, turned the fuel selector to the rear tank, cracked the throttle, shoved the mixture and propeller controls forward, unlocked the primer and

pumped five strokes, locked it, flipped the master switch on and hit the energizer toggle switch. Listening as the energizer rose from a growl to a high-pitched whine, he engaged the starter and watched the propeller begin to turn. As the second blade came through, he flipped the magneto switch to BOTH and pumped the wobble pump handle.

With a deep cough, the Wasp Junior engine emitted a cloud of smoke, caught and roared to life. Frozzleforth throttled back to keep the noise down, strapped himself in and pressed the toe brakes. He released the brakes and pushed the throttle. The Beaver rumbled forward and he pressed left rudder and brake, swinging the tail around.

He held the yoke back and added more throttle as he rolled onto the taxiway and swung around, heading toward the end of the dark runway. He set the trim tabs, pumped down takeoff flaps and switched to the center tank as he taxied.

He peered ahead, saw the runway and turned to line up. As he came around, he saw a pair of headlights racing along the taxiway toward him. "Sorry, chaps, you're a trifle late!" He leaned forward, flipped on the landing light and shoved the throttle forward. "Yipee!" he yelled as he roared down the runway and lifted off.

His vision improved as he climbed away from the airfield and turned off the landing light. He could see the lights of nearby towns as he banked to come around over the post. He leveled off at 1,000 feet indicated and continued circling, searching the ground until he located the cluster of lights that marked the officers open mess. "Aha, target in sight!" He looked at his watch and saw it was 1 minute to midnight. "And right on time!"

He pulled up, reduced power and rolled into a wingover, letting the nose fall through until he was diving at the cluster of lights. He placed the mess in an imaginary gunsight, pressed his thumb to the yoke handle and imitated a machinegun. "Ah, ah, ah, ah, ah, ah, ah!"

As he neared the ground, Frozzleforth pushed the propeller control full forward and opened the throttle, pulling up into a steep climb just above the building. He heard the scream of the propeller tips vibrating and echoed it with the roar of his laughter. "That should get their attention! Now, I'll show them what real flying is!"

Again he leveled off at 1,000 feet, throttled back, pulled into a wingover and dove toward the lights. As he neared the ground, he peered down and saw tiny forms scurrying through the lights of the entry and staring up. "Happy new year!" he shouted, opening the throttle and beginning his pullout.

The U-6 skimmed the roof of the mess and flashed across the dark parade field. The fuselage and wheels cleared the flagpole, but the right horizontal stabilizer caught the ball at the top of the pole and was torn away, carrying the elevator with it.

Frozzleforth felt the sudden jolt and the yoke went dead in his hands. Frantically, he pulled it into his stomach, but the nose continued to drop and he only had time to close the throttle and reach for the magneto switch before a pine grove claimed him. The wings were torn off as the fuselage passed between two trees. He felt himself hurled against the seat belt and shoulder harness, then he felt and knew nothing.

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As Frozzleforth floated up from the darkness, his first sensation was sound. He heard ghostly voices and strained to make out what they were saying.

"I think he's coming around now, colonel, if you'd like to see him."

"You bet I want to see him!"

Frozzleforth opened the one eye that was not covered with bandages and peered up, focusing on a white ceiling and a curious framework above him. He lowered his eye and saw a white tube resembling a leg and foot suspended from the framework. He attempted to move his leg and found it was secured. Testing his other leg, he found he could bend his knee. His right arm was free and he could wiggle the fingers on that hand, but his left was secured and numb.

"Ah, Major Frozzleforth, I see you're with us again!"

Frozzleforth painfully turned his head and saw a group of officers beside his bed. His eye widened and his mouth dropped open as he recognized Colonel Hopewell and the other officers responsible for his resolutions.

"Yes, we're all here, major! You've given us a busy time! You hit the flagpole 5 minutes after midnight and we were all there to see it!" He raised a clipboard and peered at it. "As near as we can make out, you owe the Army Emergency Relief Fund nineteen hundred dollars." He offered Frozzleforth a package of cigarettes. "Care to make it an even two thousand? I hope you've had sufficient rest and are prepared to stay awake. The accident investigation board is waiting to see you, as is the collateral board, a CID agent and a gentleman from the GAO! Then there'll be the FEB and—"

Frozzleforth held up his free hand and croaked, "Nurse!"

"Happy new year, Horatio!"

AIRCRAFT ICING

1LT Thomas E. Sieland, USAF

Weather Officer
Det 9, 16th Weather Squadron
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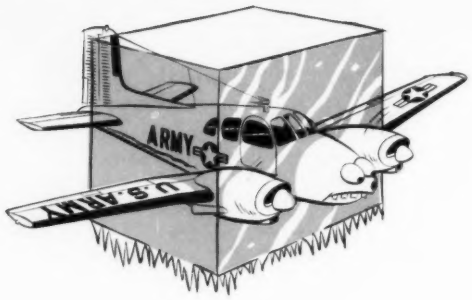
DURING LATE FALL and early winter, the freezing level in the atmosphere begins to descend until it reaches the earth's surface. This greatly increases the problem of aircraft icing. Forecasting icing is the weatherman's problem, but understanding the types and intensities of icing and what to do about them are the aviator's problems.

Before we define the types and intensities of icing, let's see how aircraft icing is formed. To have aircraft icing, two conditions must exist; the temperature of the skin of the aircraft must be below 0° C, and liquid water must come in contact with the skin of the aircraft. It is well known that the worst icing conditions occur in clouds where the liquid water content consists of supercooled water droplets. These droplets are great in number and are supported by rising air currents. Such conditions are usually more predominant in unstable or convectively unstable clouds, such as thunderstorm clouds.

Your first question is, "What is supercooled water?" Supercooled water droplets are liquid water droplets at subfreezing temperatures. Water droplets in the air do not freeze at exactly 0° C, but at somewhat lower temperatures, generally between −10° C and −40° C, depending on their purity and size. The purer and smaller the droplets, the lower the freezing temperature. When a supercooled water droplet strikes an object, in this case an airfoil or fuselage,

AIRCRAFT ICING



Know the causes of aircraft icing and

the impact destroys the internal stability of the droplet and raises its freezing temperature. The result is aircraft icing.

There are three types of icing you must face—rime ice, clear ice and frost. Most frequently, we have a combination of the first two, clear and rime ice, occurring at the same time. Rime ice is a rough, milky, opaque ice formed by the instantaneous freezing of small supercooled droplets as they strike the aircraft. The fact that the droplets maintain their nearly spherical shape upon freezing and thus trap air between them gives the ice its opaque appearance and makes it porous and brittle. Rime ice does not adhere readily to exposed objects. Clear ice is a glossy, translucent ice formed by the relatively slow freezing of *large* supercooled water droplets. The large droplets spread out over the airfoil before completely freezing, forming a sheet of clear ice. Frost is a light deposit of ice crystals which usually forms on the upper surfaces of parked aircraft by radiationed cooling in the same manner as frost forms on cars and the ground. Frost is rarely encountered in flight. Do not underestimate the flight hazards of frost formations, however. Frost left on wings may act as sublimation nuclei (sublimation is the physical process by which water vapor passes directly to solid phase without passing through an intermediate liquid phase) during takeoff and climb and may grow to serious proportions. Frost left on windshields may cause visual restriction or total loss of visibility.

Icing intensities are now standard throughout aviation forecasting. The National Coordinating Committee for Aviation Meteorology established standard terms to be used within the United States in 1964. These are:

1. Trace of Icing. The presence of ice on the airframe is perceptible, but the rate of accretion is nearly balanced by the rate of sublimation. The use of deicing equipment is usually unnecessary. This is not a hazard, without the use of deicing equipment, unless encountered for an extended period of time.

2. Light Icing. Deicing equipment will dispose of the accumulation and occasional use of this equipment may be necessary. Otherwise, the rate of accretion is sufficient to create a hazard if flight is prolonged in this condition and is ordinarily sufficient to make diversionary action necessary.

3. Moderate Icing. Use of deicing equipment is mandatory, or immediate diversion is necessary. If deicing equipment is not used, or is not available, the rate of accretion is excessive, making even short encounters under these conditions hazardous.

4. Heavy Icing. Under these conditions, deicing equipment fails to reduce or control the hazard. Immediate diversion is necessary.

Aircraft icing is generally limited to the area of the atmosphere where temperatures range from 0° C to −30° C. Icing has occurred at temperatures as low as −40° C, but this is rare. This criterion, alone, restricts icing to the lower 30,000 feet of the atmosphere. Also, all cloud types which contain liquid water are confined to the area below 30,000 feet. The clouds above this height are cirriform or ice crystal clouds, in which icing is rare.

Icing in middle and low level stratus clouds is confined, on the average, to a layer between 3,000 and 4,000 feet thick. The intensity of icing usually encountered is either trace or light. Both rime and mixed (combination of rime and clear) icing are observed in stratiform clouds. Although the intensity is generally light, the hazard to flight in these clouds lies in the great horizontal extent of the clouds, often covering 200 to 300 miles, or more.

The zone of probable icing in cumuliform clouds is smaller horizontally, but greater vertically than that in stratiform clouds. Because cumuliform clouds

how each forecast intensity affects your type of aircraft . . .

have a larger distribution of droplet sizes, there is a more varied intensity of icing in these clouds. Generally, however, a trace of light icing will occur in small supercooled cumulus, with light to moderate icing in larger cumulus and towering cumulus clouds. The heaviest icing occurs in towering cumulus just prior to the change to cumulonimbus. Although icing occurs at all levels in a building cumulus, it is most intense in the upper half of the cloud. This is the area where the largest concentration of supercooled water droplets are found. The type of icing found in cumuliform clouds is usually clear or mixed.

Frontal icing is also important. When warm moist air is forced aloft over a colder air mass, a warm frontal inversion exists. The warmer air being forced aloft condenses and forms the normal frontal clouds and precipitation. The raindrops falling from the warmer air into the colder air below will be cooled below 0° C. These droplets are then supercooled. The large droplets will produce a rapid accretion of clear ice in a short period of time. Warm frontal icing is widespread and can extend out as far as 300 miles in advance of a warm front. This is due to the shallow slope of warm fronts and the vast amount of layered clouds associated with them. Cold frontal icing is confined to a smaller area, usually within 100 miles to the rear of a cold front, in supercooled cumuliform clouds. Clear icing is more predominant than rime icing in this region. Light rime ice will be found in supercooled stratiform clouds that are found just to the rear of cold fronts.

Rotary wing aircraft are also affected by icing. The following, taken from AWSM 105-39, Forecaster's Guide on Aircraft Icing, explains the problems encountered:

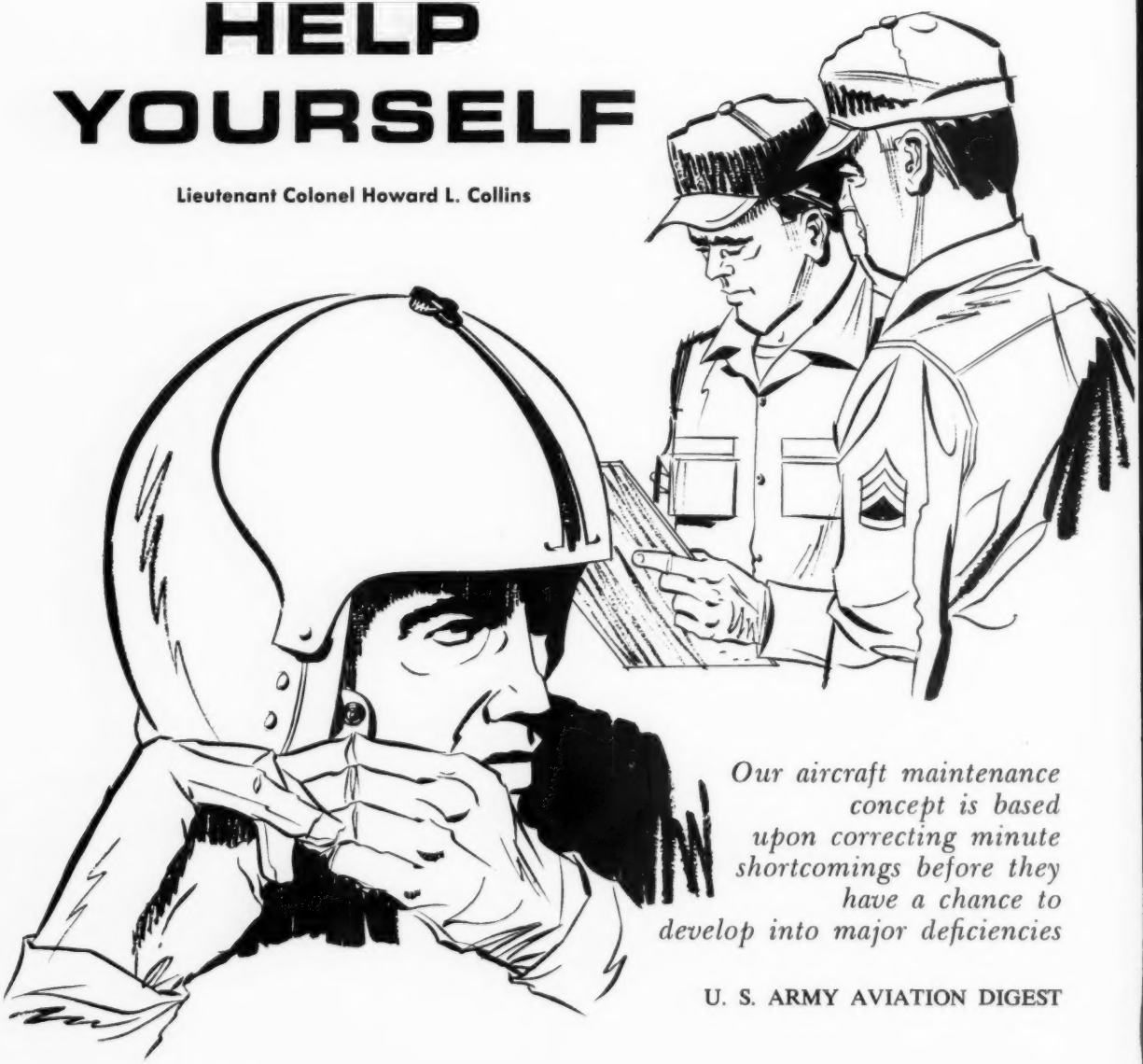
"The problems of icing on rotary wing aircraft are related to those involving wings and propellers. Rotor-icing is slightly different from propeller-icing because of the lower rotation speed of the rotors. Ice accretion on rotor blades also differs from that on fixed wings of conventional aircraft, due to the smaller scale of the helicopter wing, to the variation of airspeed with rotor blade span, the cyclic pitch-changing of the blades, and the cyclic variation of airspeed at any given point on the blade in conditions of forward flight. Ice accretion on the main rotor blades is more hazardous than ice on fixed wing aircraft because the helicopter, while hovering, normally operates very near its peak operational limits. Tests conducted by the Canadian National Aeronautical Establishment indicate that small amounts (about 3/16″ thick) are more than sufficient to prevent a helicopter from maintaining height during hovering flight. Secondary effects are vibration, damage by flying ice, and limitation of throttle movement by premature stoppage. Icing also affects the tail rotor, control rods and links, and air intakes and filters. Other parts of the helicopter are comparatively poor collectors because of their relatively large scale and low airspeed."

Other serious hazards to be aware of are puddles of water, mud or slush on the runway. With the temperature of the airframe, especially the landing gear and flap hinges, below 0° C, water splashed by the wheels can form ice on control surfaces. This could cause the gear or flaps to remain frozen in a down position, or worse, allow the gear to retract and then become frozen in a retracted or semiretracted position.

The operational effects of aircraft icing on your type of aircraft depend upon aircraft speed, wing and fuselage design and engine size. Know the causes of aircraft icing and how each forecast intensity affects your type aircraft and you will be well prepared for the coming season.

HELP YOURSELF

Lieutenant Colonel Howard L. Collins



Our aircraft maintenance concept is based upon correcting minute shortcomings before they have a chance to develop into major deficiencies

U. S. ARMY AVIATION DIGEST

WHO CAN PREVENT accidents? Only *you!* As an Army aviator, you can best help yourself by being prepared for *all* emergencies which may arise while flying. Impossible? Perhaps. But you reduce the strain on your guardian angel, lady luck and the law of averages by being thoroughly familiar with your aircraft and its idiosyncrasies, plus all rules and regulations governing its operation. Study the operator's manual. *Report all deficiencies or shortcomings.*

A recent discussion among aviators confirmed a longstanding suspicion that many people are reluctant to write up deficiencies and shortcomings found during flight. Why is this? Is it because the average aviator is not an experienced maintenance officer and might make an entry which would tend to degrade him by showing his ignorance concerning the aircraft? Or is it because the deficiencies and shortcomings seem so trivial that immediate attention is not necessary? Perhaps Sergeant Smith is such a red hot crew chief that just mentioning the trouble to him will bring about the corrective action and eliminate all the paperwork involved in doing the job right.

Every aviator is required by regulation to conduct a thorough preflight of his aircraft and its associated records prior to flight. Most apply a conscientious effort. We look the aircraft over thoroughly for tire inflation, security of all components, loose or missing parts and general mechanical condition. We check the 2408-13 for uncorrected writeups which might affect safety of flight. *Sometimes,* we even check all the way back to the 2408-14, as required, for uncorrected faults, including overdue replacement of components and parts and the reasons for delays.

What about the problem Jones found during the last flight, which was not entered in the book? The one he told you about as you passed, crossing the ramp: "Watch the No. 2 engine. It tried to quit a couple of times, but I leaned it out good and the plugs cleared up OK." Sound familiar?

We must realize that maintenance cannot be expected to correct a deficiency about which maintenance personnel are not aware. And these things don't normally correct themselves. Quite the contrary! They usually linger until a marginal condition develops into a major deficiency and a forced or precautionary landing. Not good preventive maintenance, is it?

Our aircraft maintenance concept is based upon correcting minute shortcomings before they have a chance to develop into major deficiencies. Help yourself and your fellow aviators by entering all minor gripes on the 2408-13 so they get prompt attention and do not embarrass you when your colleague has to call for a ride home.

Your job as an Army aviator requires that you fly to the best of your ability within the limits of your aircraft to accomplish assigned missions. This task is demanding, requiring confidence in your ability and confidence in your aircraft. Help the maintenance officer to hold up his end of the bargain. Make him aware of the problems you are having with the equipment to which you entrust your life and the lives of your crew and passengers.

You say the maintenance officer wouldn't be happy with some of your writeups and will probably think you are hypercritical of the equipment? He may even consider you an old grandmother? Perhaps, in some cases, an inexperienced maintenance officer may feel you are trying to persecute or sharpshoot him. Unfortunately, all organizations are not blessed with a highly experienced pilot, thoroughly versed in all aspects of maintenance, to serve as aircraft maintenance officer. However, most maintenance officers realize you are only trying to help them perform their jobs better when you make them aware of aircraft irregularities for which they are responsible.

Any entry you make requires the attention of

We must realize that maintenance cannot be expected to correc

maintenance personnel. This may only involve transcribing the entry forward to a new 2408-13 each day. When this happens, the next aviator is at least aware of the shortcoming and can analyze the situation for himself. Suppose he decides the situation is normal or nonexistent. Are your feelings hurt? They shouldn't be. Shortcomings are frequently the sneaky type that come and go, or show up only under certain operating conditions. Your entry becomes a part of the history of the aircraft and may well prove valuable at some later date in diagnosing the cause of a recurrence of the same or a similar problem.

In any event, when you write up shortcomings, you have entered your opinion of a potentially dangerous situation on record. Any other aviator or maintenance officer must then assume responsibility for eliminating them by requiring corrective action to be taken or by signing them off. Either way, you are off the hook, since you brought the shortcomings to the attention of all concerned. This is your responsibility to yourself and your fellow aviators.

Suppose the individual next confronted with your writeup is the maintenance officer? Perhaps the crew chief decided the situation was beyond his capability and he needed help. The maintenance officer has several courses of action open to him. As the direct representative of the CO of the unit involved, he may look the shortcomings over and determine that no corrective action is required. Take the case of minor dents in a wing or fuselage. He need only record "negligible damage" in the corrective action column and sign it off. Or he may decide a test flight is required to properly evaluate your entry. The results of the test flight may require unscheduled maintenance to correct your entry, or it may reveal a situation which, although not perfect, is still within prescribed tolerance, according to appropriate technical manuals with which the maintenance officer is more familiar than you. Here again, he may make an entry in explanation and sign off your entry.

The maintenance officer may also conclude that corrective action is required. Because of the minor nature of a shortcoming, the fact that it could not affect safety of flight and could not develop into a grounding condition, and the extremely heavy workload at that moment, he may transfer your entry to the 2408-14 as a delayed shortcoming to be corrected at the next periodic inspection, or when required parts become available.

The maintenance officer's actions, whatever they are, should not embarrass you. It's his job to make such determinations. Remember though, you must be as explicit as possible in entering your explanation of any problem you encounter. Tell exactly what happened and the conditions under which it occurred. Take several lines if necessary. If the maintenance officer still doesn't understand your entry, he will look you up and ask about it.

Are you getting the picture? We are saying you can help yourself by helping the maintenance officer perform his job of keeping your aircraft in a safe flying condition. Properly written up, the shortcomings you find are going to receive some attention and not remain a burden in the back of your mind—to plague you until you are once again uncomfortably seated in the same aircraft, wondering just what will happen this flight.

Let's discuss another way that you, the aviator or mechanic, can help yourself. Information concerning a malfunction, component failure or inadequate maintenance practice frequently does not reach the people who can provide suitable corrective action. Numerous incidents have occurred which vividly indicate a desire to "let sleeping dogs lie." "Don't point the finger toward yourself" has frequently been the approach in such matters.

One major accident, caused by dual engine failure and resulting in total loss of a helicopter, might have been prevented if information about a previous similar accident had been properly disseminated. Fortunately, no lives were lost. Don't be guilty of concealing information which might prevent an accident through intentional or inadvertent action. Of course, this couldn't possibly apply to me, you say. We all think we're not guilty of such flagrant derelictions of duty. No conscientious person would intentionally withhold or conceal information which might prevent an accident or save a life.

Notice the word *intentionally*. How often have you, through negligence or indifference, failed to provide all details concerning a forced or precautionary landing? These details, such as power settings, emergency procedures used, etc., could be extremely important to those analyzing a system or

a deficiency about which maintenance personnel are not aware

component failure.

At least two agencies are vitally interested in every malfunction or maintenance error resulting in an accident, incident, forced landing or precautionary landing. Both are in positions to cause corrective actions which might prevent recurrence. Like the maintenance officer, they can do nothing about a situation of which they are unaware.

The U.S. Army Board for Aviation Accident Research and the U.S. Army Aviation Systems Command can help you to help yourself if you make them aware of your problems. How can you do this? Screaming about spark plugs always fouling out or the actuator you have to replace once a week really doesn't do much good as your screams will not be heard several hundred miles away. How about reminding them of your problems in writing? Two courses of action are open to you. I refer not only to aviators, but also to crew chiefs who invariably have to perform the maintenance required to keep an inadequate system in operation.

If a malfunction occurs in flight, causing a forced or precautionary landing, don't rest until you're certain you have done everything within your power to determine the cause. Many times this will be beyond your capability due to the echelon of maintenance involved. Even so, you can submit every scrap of information at your disposal concerning the mishap in the form of a teletype message to those who can help you eliminate the problem. Crash facts messages require this information. Although AR 385-40 cannot possibly cover every detail of each situation you may encounter, it does give you an excellent point from which to start. Any bit of information concerning the event will help. A history of previous malfunctions might prove especially helpful.

Often the actual cause of a malfunction is not immediately available. When this happens, the required message must be transmitted, minus the answer to the most important question—why did it happen? We can't always come up with an answer within the allotted 8 working hours, even when the analysis and corrective action is within the scope of unit maintenance. The message required by AR 385-40 should not be held up, pending system analysis, when considerable time will be required to do the job accurately. An "unknown" entry can be inserted for those items, with a notation that supplemental information will follow.

Later, perhaps several days after the original message, when thorough analysis of the component or system has revealed the actual cause of the failure or malfunction, the supplemental message, referencing the original, can be sent, indicating the reason for failure and the additional data required. Failure to send this supplemental information will render your original message useless. USABAAR and USAAVSCOM can do little toward preventing similar mishaps if they don't know what you found to cause the original.

Equipment Improvement Recommendations provide the remaining course of action through which you can bring your problems to the attention of those in position to provide corrective action. Granted, you will not always receive an answer to your EIR. Sometimes, the answer you do receive may not satisfy you. Even so, you have brought the problem area to the attention of those in position to provide corrective action. If the problem is not an isolated case, and other EIRs on the same subject are received, you can rest assured that corrective action will be taken. For proof, read Equipment Improvement Report and Maintenance Digest (TB 750-991-1/2/3/4 for fixed wing and TB 750-992-1/2/3/4 for rotary wing). These digests are published annually and updated quarterly. They contain information on EIRs of case significance, publication changes resulting from DA Form 2028 submissions and list recurring errors that have been noted in completed TAERS forms.

Here again, you can help yourself by sending EIR control numbers to USABAAR in crash facts messages to enable USABAAR personnel to trace down your problem and determine what action is being taken to correct the situation. Any previously submitted EIR control numbers on the same component or part should also be included to provide historical data, including the extent of each particular malfunction.

You can prevent aircraft accidents and other mishaps by helping yourself through prompt reporting of the facts and circumstances surrounding any event you have knowledge of, or in which you were involved. HELP YOURSELF!

PEARL'S *personal equipment and rescue/survival lowdown*

WHY SCAN?

Captain Perry G. Walker

Standards Division
Department of Rotary Wing Training, USAAVNS

WITH YOUR LEFT eye closed or covered, look directly at the black circle with the right eye. At a distance of about 1 foot, the black square will be invisible in your peripheral vision. At distances closer and further away, the black square above will again be visible. However, the area blotted out by your blind spot increases with distance. It could even make a large airliner disappear, providing your eye remained focused on the same spot and did not move.

Now move your eye to the right, left, above or below the black circle. Note the black square again appears on the periphery of your vision. Scanning eliminates blind spots. Improve your scanning habits. Keep both eyes open and moving. This is even more necessary after dark.

Dear Pearl:

I have read your article "Why Wear Nomex?" in the September 1969 AVIATION DIGEST. Request information concerning availability of Nomex flight suits for National Guard aviation units and necessary information to requisition them, if available.

CPT James R. Winn
Aviation Safety Officer
441st Med Det (Hel Amb)
Lexington, Kentucky 40504

Dear Captain Winn:

A single layer, two-piece 4.4 oz/yd² Nomex flight suit has been type classified Standard A and made available only to units in Southeast Asia (SEA) and five training bases within CONUS (Ft. Huachuca, Ft. Wolters, Ft. Rucker, Hunter-Stewart Complex and Ft. Eustis).

A double layer, two-piece 4.4 oz/yd² Nomex flight suit proposed for worldwide use as the standard summer flight suit did not satisfactorily pass its engineering and service tests.

A great deal of deliberation is presently being given at DA level to resolve which flight suit to adopt for worldwide use. Until such a decision is made, a determination of when Nomex will become universally available cannot be even estimated.

Necessary requisition instructions will be issued, I am sure, prior to the availability date of whatever uniform is selected for worldwide use.

Pearl

If you have a question about personal equipment or rescue/survival gear, write Pearl
U.S. Army Board for Aviation Accident Research
Fort Rucker, Alabama 36360

Flyers' eyes on a windy street,
Be they timid or bold-eyed flirts,
Scan the girls from head to feet,
And watch the blowing skirts!
But some of these eyes in aircraft,
Don't scan for the best of vision,
Don't see the one abeam or abaft,
The result's a midair collision!
SCAN, YOU FLYERS! SCAN!
FEBRUARY
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STRANGE AREA SENSE

Major Chester Goolrick

Adapted from DA Pamphlet 95-4 January 1960

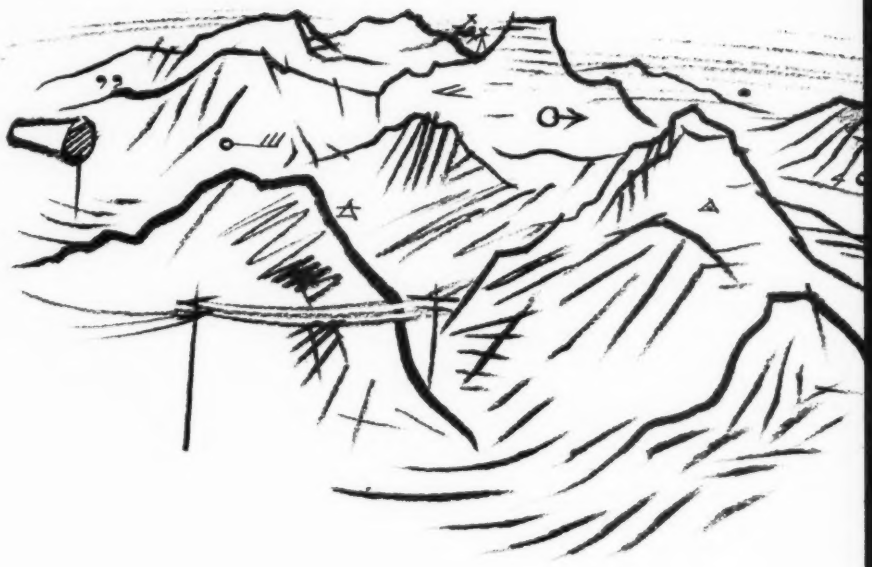
XU

IN THE OLD WILD WEST, every area was strange and every outsider regarded with deep suspicion by anybody who'd been around longer than 2 weeks. A newcomer had to step softly and think twice before he even asked a passing cowpoke his name or at least that's the way the TV shows say it was and Marshal Dillon is never wrong. Let a St. Louis dude stride into Dodge and 17 gunmen blasted at him from behind the livery stable; if they missed, he was knocked off by flying bodies hurtling out of the Rose Palace Saloon. For the wanderer in strange places, life was always tough and likely to be short. But those days are gone and the descendents of the few who managed to survive are the same as the rest of us, paying bills, missing putts and worrying about the proper fit of a jacket around the shoulders for the Ivy League look.

Well, maybe not *all* of us. The Army pilot is a traveler in odd areas, a flying man as terrain-conscious as Billy the Kid spotting the deputies behind an innocent-seeming rock. He is a hardnosed fellow with a keen eye for the slightest variations in wind direction and obstacles down low, as well as a healthy respect for the strange areas all over the world where he's likely to bed down with the troops, not on foam rubber but close to the cold, cold ground. At 40,000 feet and mostly on instruments, the jet pilot whips over new territory before he has a chance to say pleased-to-meet you; the Army pilot, down there where he can almost count the squirrels, develops more than a nodding acquaintance with Bushmen, kangaroos, trout fishermen, palmettos and Alaskan huskies. In a decent sort of way, he is the Peeping Tom of aviation, supposed to be sufficiently low down to take in the sights. The Army pilot has more fun out of flying than practically anybody else and, of course, faces certain special hazards too.

Not the least of these is that he *does* fly in out-of-the-way places—some well-mapped, some not—frequently at altitudes favored by crop dusters and kids on swings. If the strange areas are not always overseas but merely part of the Louisiana, Georgia, or Montana scenery, the Army pilot still has to develop an intimate acquaintance with the landscape—high-tension wires, fire and television towers, variations in contours, and so on—because he is very often down there where such obstacles present solid and immovable snags to low-flying aircraft. By the time a young fellow is through with his Rucker training, he has a good knowledge of the scenery around there, which is fine. The point is, from where he sits, the rest of the whole world is a strange area, even his own backyard. Unless he's had a fair amount of private flying experience, he has never really seen it before from the air.

So this is a large subject and if you want to conclude that an Army pilot must be as alert as a mountain guide and own the reflexes of Buffalo Bill, go right ahead. The good one is necessarily a very sharp flyer indeed. Let's take a look at the public life of an old Army flying hand and observe what qualities have brought this veteran safely from cowpasture to llama



run all the way from Peoria to Peru.

In the first place, he's had *practice,* learned most of what he knows under tough tactical conditions. Our friend has been around, run into problems, figured angles, studied terrain, not spent most of his flying time popping in and out of commercial fields with 8,000-foot runways, revolving beacons, and squads of FAA specialists to wring his hand before and after a grueling swing around the strap. He's been out with the lads in the kinds of moon-landscape places where wars are fought and pilots have to manage aircraft with skill and finesse if they're to be worth beans to the Army.

After all, Mickey Mantle was probably a pretty awkward small boy until his father put him through the long workouts that made him deadly from both port and starboard. Don Juan himself was once a 95-pound weakling with the ladies until he perfected a certain amount of technique through practice. The veteran Army flyer had to master technique too, but he was not handicapped from the very start by the kind of unit commander so concerned with his safety record as to shy away from the short field and barrier work that really indoctrinates young pilots in the practical problems of flying in strange areas. Nobody is opposed to safety—that would be like hating home and mother—but the really safe pilot is the one who has been exposed to danger often enough to recognize it when he sees it.

The overcautious unit commander will have a dandy safety record as long as the supply of comfortable, tailor-made strips holds out and no emergency rears its ugly head. Once let his unit be forced to use cowpastures the size of a shirttail and the accident rate zooms. Why not? The youngsters have not had the practice they need. The rugged training that maybe produces a *few* accidents now prevents MORE and WORSE accidents later on when the chips are down.

All right then—*practice*. That is to say, hard, practical training in unfamiliar territory under conditions that actually face pilots in the field. The flying man who's had it too soft is like the old-fashioned country boy with a mama who never mentioned sin.

GLOOMY GUS ALOFT

The same veteran we've been talking about is a joy to his wife, a jolly companion to the youngsters, a spreader of cheer around the base. Dogs that bite postmen run to him with tail awag, small fry ask him to fix model airplanes. He is always happy to oblige, always the man with the big, broad smile—*on the ground.* Put our man in an airplane, especially in a strange area, and his character changes. If that unfamiliar terrain could reach up and bite him, it

The Army pilot is a traveler in odd areas, a flying man as terrain-conscious as Billy the Kid spotting deputies . . .

would. Any moment he expects his engine to develop a bad case of the heaves. His map is probably wrong. He keeps looking around for a good spot to set her down in case of the trouble he is sure is just around the corner.

Is this good?

Indeed so. Our old hand is still around to pleasure the community because he has worked out a kind of Murphy's Law for use in the air:

IF THE WORST *CAN* HAPPEN
THE WORST *WILL* HAPPEN

Healthy skepticism, especially in unfamiliar territory, is what keeps the veteran keen of eye, firm of hand, and in one piece.

Anybody about to take off for a hop in airplane or helicopter across the Gobi Desert prepares himself for trouble by studying his maps, memorizing every word of the briefing, and loading up with all the survival gear he can find. Rugged territory like the Gobi or the Nevada wastes is so obviously dangerous only a lamebrain attempts to face it without adequate preparation. What's a sight harder is to expect the worst over new terrain that looks as smooth as the White House lawn or harmless as a little girl togged out for Sunday School. Here's why.

The main word is *confusion,* and even the best, the most experienced pilot can suffer befuddlement, however temporary, over the most innocentlooking new territory. This is particularly true if the strange area bears a marked similarity to what he thinks of as home base. A water tower that has all the appearances of the one at Flegenheimer's Brewery doesn't point the way at all; it simply distracts him by reminding him of a landmark he has grown to know and love like a brother. In the instant he takes to

STRANGE AREA SENSE

From where the pilot sits, the rest of the whole world is a strange area, even his own backyard

realize he's not near home at all, he may meet the wire or other low-lying object that spells disaster, especially at the altitudes favored by Army flying people. Figure it. Pooped after a day in the cockpit, called on to put out the best he has to sit down safely in strange country, the momentarily confused pilot faces a somewhat different problem from the one making a routine landing at a base he knows from A to Zulu.

Not our old hand. When he sees an apparently familiar object in out-of-the-way territory, he just plain doesn't believe it; he knows that disorientation and worry in unfamiliar areas is normal. He remembers flying a rented plane over terrain he had never seen before, though the country below was enough like the area around his base to be confusing. So what happened was that he had real trouble convincing himself north really lay in the direction the compass said; in fact, he was considering a turnback when he realized the new country, so much like his own home territory, was actually hypnotizing him. The rest of the trip was no strain or pain.

SLICE IT RIGHT

Confusion stems from scatter-headed thinking, or what the Aviation School labels *improper division of attention.* Army aviators are like jugglers: they must keep four important balls continuously in the air:

1. control of the aircraft
2. alertness for other aircraft
3. ground observation
4. in-flight planning

And the secret for success is placing attention where it should be at a given time, never allowing irrelevant details to fog the issue, never concentrating on any one item to the exclusion of the others.

Put it like so: FAULTY DIVISION OF ATTENTION leads to CONFUSION which heads a man straight for the ERROR that can do him in. This sequence has a jolly way of starting out in strange areas. During a 4-year period, the Army blamed 33 major crashes on lack of alertness, which began with weak division of attention. These accidents produced 22 fatalities and an extremely high percentage of total destruction. What's more, the figures are for major accidents only; nobody will ever know how many minor mishaps were also a direct result.

The danger is that this temporary confusion can sneak up on a man just when he is performing some of the hardest flying there is, the kind that is the Army's special problem. Here's one fellow scouting a new strip, and another tracking down a lost chopper pilot so far back in the wilderness the natives haven't heard about the invention of the wheel—routine assignments for most Army pilots. If an interest in new scenery causes one of these lads to pull his thoughts away from where they should be, he finds himself on the wrong side of the daisies.

So our old hand has a point in making the quick shift from Smilin' Jack to Old Scrooge as soon as he hoists himself into a cockpit. He expects to be confused in strange areas and sometimes is, but he never

permits the sequence to proceed from there to the possibly fatal blunder. The veteran keeps the various parts of his attention thoroughly glued in place because he has the right mental attitude for operating in new territory, assuming the worst and exercising extra caution. Nor did he acquire this reasonable frame of mind merely from reading pamphlets, watching training films, and collecting pearls of wisdom from his elders. He picked most of it up the way all pilots know is the best: sound, realistic practice under field conditions.

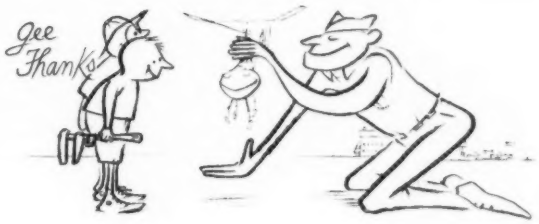
BEDROCK

Of course a little homework helps too; the old hand is not simply ordered to fly off into the unknown and to come back or else. Like everybody who flies aircraft, pilots ships, or drives cars, he reads maps.

That is to say, *reads* them. Trained to interpret maps properly, he does just that, putting himself in the pleasant position of having at least a handshaking acquaintance with a strange area before he takes his first look at the place. Information is squirreled away in his wise old head and the map goes right along with him on the flight.

All of which is as obvious as a large hole in the head. What to find out about unfamiliar territory? Get a good map and study it, man. The Army has large supplies of excellent maps prepared by all sorts of fine, upstanding people. And the Army trains its aviators to understand the maps available; so what's the difficulty?

Always jolly on the ground, in a strange area he becomes Gloomy Gus



One trouble is careless map reading. One crash occurred because the unfortunate pilot failed to interpret the elevations plainly marked for him and tried to fly in new territory at an altitude below the terrain shown on the map, making the interesting

discovery that, while low-level operating has its problems, subterranean flying is impossible. The number of avoidable accidents caused by improper mapreading is hard to pin down, naturally, because no grown man wants to confess he read the thing upside down, made a simple mistake in calculation, or misinterpreted a symbol. Or what may be more to the point, that he failed to go over the charted information thoroughly as part of his preflight procedure and so had to give the map too rapid a study in the air, another dandy way of bringing on improper division of attention.

Not that maps tell all. The way they're putting up television towers and stringing wires these days, it would take a full-time, four-armed mapmaker to keep up with the changes. Maps don't say much about local pecularities like the steady 20-knot wind that makes Clancy's Gulch an interesting problem

Healthy skepticism, especially in unfamiliar territory, is what keeps the veteran keen of eye . . . and in one piece

for the low altitude flyer and the haziness which is a special feature of Goolrick's Swamp after five in the afternoon. A stranger to a given area makes a point of storing away such nuggets of information, learned about by asking around.

In the relatively few places in the world not yet thoroughly mapped, the smart pilot has that healthy skepticism working overtime. Ancient local maps, designed with goats and Stanley Steamers in mind, demand the sharp ear and inquiring mind at briefing sessions: the new word is better than the outmoded chart.

LOOK-SEE

Though maps are fine and briefings dandy, nothing takes the place of a firsthand study of strange terrain from the air, the moment of truth when a man goes to see for himself. Rigid adherence to the etiquette of meeting new territory is in order: first HIGH—then LOW. You can't have one without the other. Our veteran friend makes his high-level reconnaissance of the area to fix the general details, then cautiously descends to find out what traps and snares lie below, a simple enough procedure but apt to slip the mind of a lad either too interested in the new scenery or too eager to finish his job too fast. Some time ago, a pilot with a fair amount of promise in his profession remembered to go through the high-level routine with admirable precision, then neglected to do his lessons low down. The result, a serious snarl with a high-tension wire.

Faulty division of attention leads to confusion, which heads a man straight for the error

Put it this way: strange areas insist on just as much respect as your grandmother did. The chap who forgets this basic truth has his head bashed with something harder than a lace parasol.

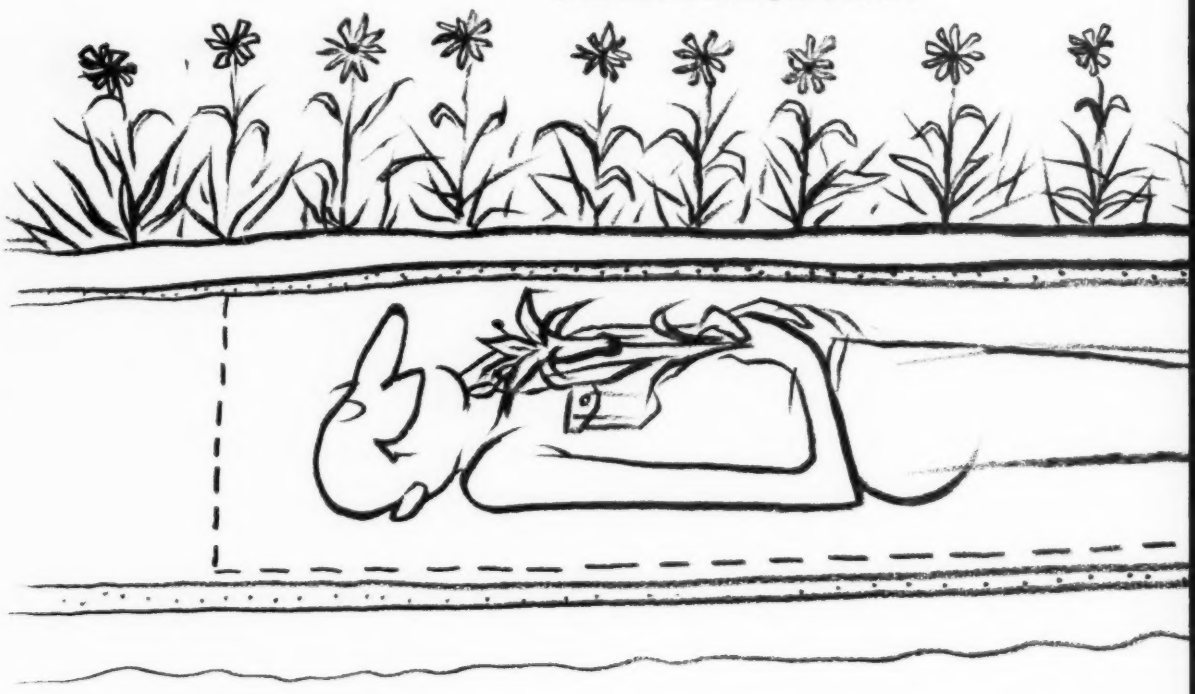
No matter how many times others have flown over a given chunk of territory, the first time a new pilot goes over the place makes it strange to him, enough to cause him to watch for the mixed emotions that rouse up the terrible trio of Improper Division of Attention, Confusion, and Error. The fellow who snagged the wire because he forgot about low-level reconnaissance is a sad instance of underdoing his job; another concerns the pilot handed the task of determining whether a strip of road was suitable for landing fixed wing flying machines. He went through all the motions of high- and low-level reconnaissance, but not really with his whole mind, overlooking the rocklike fact that at one point the trees on both sides of the road closed in with acute suddenness. He found out what the surface was like all right (hard) and tore cff his wings in the process.

EASY DOES IT

No need to overdo this low-down looking around,

STRANGE AREA SENSE

If an interest in new scenery causes the pilot to pull his thoughts away from where they should be, he finds himself on the wrong side of the daisies

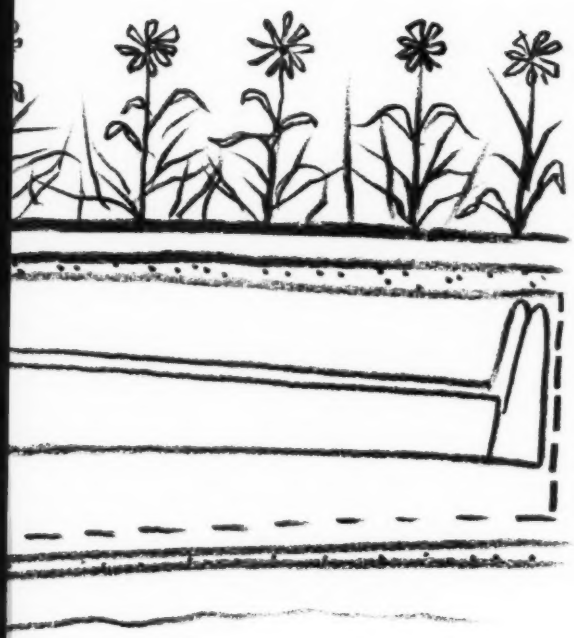


either. A reasonable minimum altitude for carrying out a tactical mission depends on the mission itself and such other factors as the height of obstacles in the flight path, the nature of the terrain, and turbulence. Our old hand firmly sets his minimum altitude after weighing all the factors in terms of his experience. Nothing tempts him to go any lower.

Sometimes the sheer excitement of a field mission leads a young pilot to go below where he should. Asked to simulate a strafing mission against an "enemy" position not long ago, one overeager lad went about his task like the last of the Kamikaze suicide pilots. Awe-struck soldiers in foxholes reported he must have been caught by a downdraft at an altitude of 10 (count 'em) feet just before he wound up in the blackberry vines. The kind of daring that brings on disaster is strictly for the comic strips.

Generally speaking, from 20 to 40 feet above the highest obstruction in the flight path can be considered a reasonable minimum for most Army missions, depending on terrain and turbulence, to be sure. The point is, our old hand leaves himself as comfortable a margin as is consistent with the success of his assignment. He never forgets that lower flying requires tighter turns to keep an object in view and that tight turns are an open invitation to stalls. It's not necessary to be able to read paragraph two of the third indorsement of an enemy field order to determine which way a convoy is heading. Our veteran friend determines the *reasonable* minimum and stays on the right side of it. Double in spades over strange terrain, where unknown obstacles and pitfalls may lurk.

The helicopter is a fearful and wonderful machine; it is also so tricky to fly a man can't just gaze serenely at the scenery and let the chopper take care of itself. More than one pilot, in that strange state of confusion that new territory seems to bring on, has attempted to sit down in a forest clearing too small for his 'copter. Others have allowed the country to distract them from ground turbulence or the decreased ground effect caused by heavy vegetation. Some have put down their helicopters before really making certain of the condition of the turf below. And—again part of the confusion developed in un-



familiar areas—a few unfortunate souls have trudged home, red with shame, after forgetting to (one) tie down their helicopter rotor blades or (two) untie them before trying to take to the air.

Back of these regrettable affairs was faulty division of attention, confusion, distraction, error. On home territory they wouldn't happen; in strange country, they multiply like rabbits in spring. Operating at an altitude that gives him a good margin and taking a long, cool look around before committing himself—that's the mark of the wise flying man in unfamiliar territory.

HANG ON

Sometimes a fellow might get the impression from too much talk about prudence and caution that it's smarter to stay in bed than to venture out into the dangerous world at all and no careful man even climbs a kitchen stool without a parachute. Push that kind of thinking too far and a chap finds himself worried about being snatched away by eagles in the Bronx or set upon by maneating tigers in Kansas City. Pretty soon nobody would be daring enough to drive a car, pilot an aircraft, or chew a stick of gum (egad, might stick in the old windpipe).

Strictly silly stuff, of course. No one argues for

that point of view except a few poor old ladies with the shakes and other timid folk who form all their ideas about the hazards of life from the gaudier stories in tabloids. What we're after here is simply a common sense approach to some of the difficulties inherent in flying around unfamiliar places.

Take our good friends in the reserves. It's only reasonable that they should exercise more than the usual amount of care because, after a fair interval between flying assignments, they are perhaps more likely to forget the extra dashes of prudence that keep a man from faulty division of attention, confusion, and error. A few of these excellent fellows, accustomed to flying civilian aircraft with tricycle landing gear, have wound up on their backs because they forgot that the Bird Dog has nothing under the nose but half a propeller. Some have failed to remember one of the oldest of all Army flying lessons: a straight line is not necessarily the safest way between two points— that it's smart, particularly in new areas, to look for the way that offers a place to sit down in case of trouble.

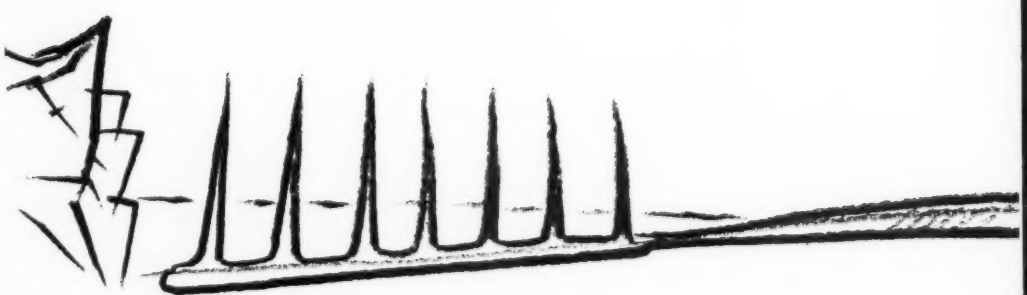
Regular hands have their off-moments too. Faced with an emergency landing over strange territory one winter, a reasonably experienced pilot limped along until he saw a flat, friendly-looking, snow-covered field with the tips of the vegetation poking through the surface and assumed he was seeing some plain, garden-variety, patriotic American lawn grass. Down he came. His assumption was wrong. The stuff was reeds, the place was a snow-covered swamp, and the pilot was in up to his neck.

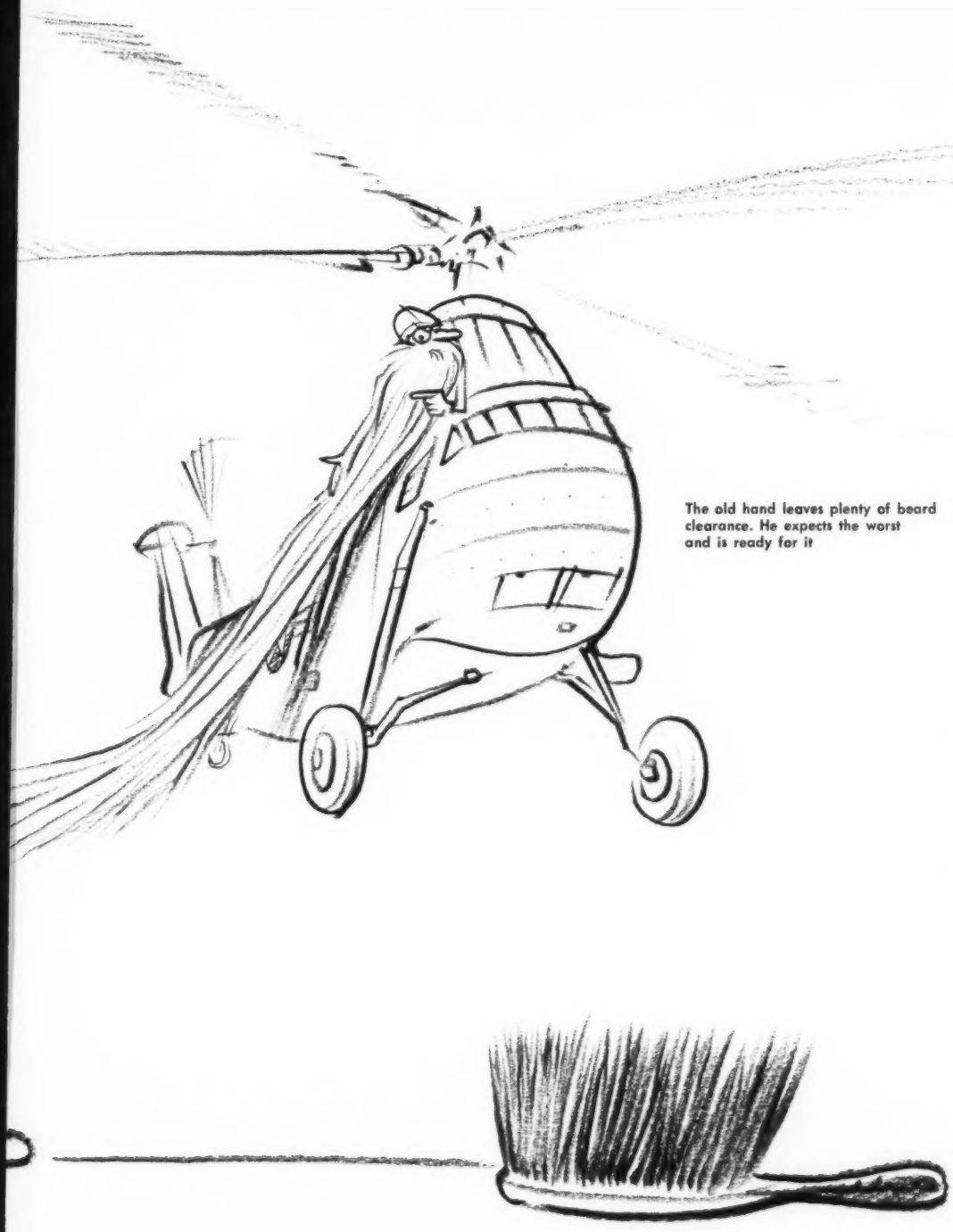
ADD IT UP

The formula for strange area flying is a very simple one: a big slice of actual experience under field conditions plus more than the usual dashes of extra alertness and caution. To be included in the last elements is all the information a pilot can pick up from intelligent mapreading and close attention to briefing, formal and informal.

Not to mention *attitude of mind*. As we have seen, the veteran expects the worst and is ready for it. What's more, he never makes snap assumptions; he checks and doublechecks before committing himself. That's why he never permits his mind to wander away from *any* part of his exacting job—faulty division of attention does not lead to confusion and then on to the serious error that can cut him down. Like the newcomer to the Old Wild West, he moves with caution in unfamiliar territory.

He's now in the position of telling his friends and relatives, with modest pride, all about the strange country he saw instead of the strange country he ran into.





The old hand leaves plenty of beard clearance. He expects the worst and is ready for it

USAASO Sez

The U. S. Army Aeronautical Service Office discusses

Pinpointing AN/FPN-40 maintenance problems
The value of radar vectoring
Ground visibility problems

AN/FPN-40 Maintenance: Rumbles from the field indicate that some airfields are experiencing difficulty in keeping those AN/FPN-40 GCA radar sets, which have been overhauled at Tobyhanna Army Depot, Pa., on the air. A lot of name calling and blame placing have occurred and, in most cases, the crux of the real problem has not been identified. The overhauled equipment has been modified to accept IFF. This means that, in addition to new circuitry, completely new solid state components have replaced the old type. Unless maintenance personnel have completed the Ft. Monmouth course on the 40 since it was revised to include the latest mods, this lack of knowledge could be the reason you are having GCA problems. All commanders should assure that the knowledge and capabilities of their GCA maintenance personnel have kept up with the state-of-the-art. Although it means the loss of an individual for a five-week period, we recommend that GCA radar maintenance personnel be scheduled into that portion of the FPN-40 maintenance course at Ft. Monmouth which covers the IFF modification. Your next question should be, How do I get my people into that part of the course? The answer is to submit to USCONARC a request for the five-week block of training on the IFF modified AN/FPN-40 in the Ground Controlled Approach Radar Course No. 104-26D20. This applies to both military and civilian radar maintenance personnel.

On Radar Vectoring: Radar vectoring provides valuable assistance to pilots and to controllers alike. It can be used for expediting traffic, avoiding flight hazards and/or providing general assistance to the pilot. It is a valuable tool; however, pilots are cautioned, it is not infallible. The responsibility for "see and avoidance" when operating in visual flight conditions, belongs to the pilot.

Radar vectoring service is provided to both IFR and VFR traffic. IFR traffic may receive radar vectors at the discretion of the air traffic controller and on certain occasions, such as avoiding a thunderstorm, at the request of the pilot. VFR radar vectoring service is normally limited to terminal areas and is usually provided only at the request of the pilot.

Do not hesitate to request a radar vector when it will assist you; however, do not become complacent in the use of it. Stay alert, especially when operating in VMC—the responsibility for collision avoidance is yours!

On Reduced Ground Visibility: Some airfields occasionally experience extremely low visibility, especially during periods of heavy precipitation and/or seasonal fog. In such circumstances, it is possible for pilots to become disoriented during ground operations. There have been instances where aircraft have inadvertently crossed active runways, taxied onto auto routes and taken off from taxiways. Confusion may be compounded by the fact that ATC personnel also may be obscured and unable to provide constructive assistance. Safety for self and others is enhanced when pilots exercise extreme vigilance and proceed cautiously under such conditions. Pilots should advise controllers at the first indication of becoming disoriented either on the ground or in flight. HELP or HAZARD may be only just around the corner!

HOW CUM?

DID YOU EVER see a bird have an accident?

Some birds make pretty weird landings. That's DESIGN ERROR.

Birds get smashed by hail, thunderstorms, etc., but that's WEATHER FACTORS.

A bird with a broken wing can't fly, but that has to be a MAINTENANCE FAILURE.

And of course the mother bird may push the youngster out of the nest too soon. Call that SUPERVISORY ERROR.

What I mean is the plain, old garden variety BIRD ERROR accident. Like a bird fails to pay attention to what he's doing and flies right into a tree trunk. Or he gets so engrossed in looking at something that he quits flapping his wings and goes crashing to the ground,

Why is it then that this lowly creature, who can't read, can't reason and can't benefit from other birds' experience and who knows only what instinct and his mama taught him, goes through life without having accidents?

And why is it that us thinking, reasoning, superior, intelligent human critters do?

Submitted by LTC Herbert A. Guderian, Aviation Safety Officer, Ft. Hood, Tex.

Safety is like castor oil - hard to take, but results are assured.